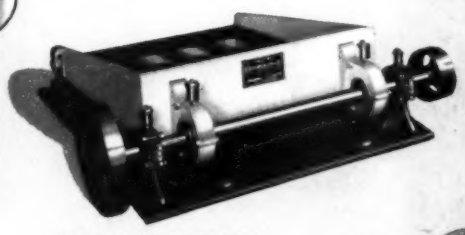
THE PAPER INDUSTRY
and PAPER WORLD
AN EDUCATIONAL NEWS MAGAZINE — JUNE, 1942

THROUGH TODAY'S UNCERTAIN PAPER MARKETS
TO THE YEARS THAT LIE AHEAD . . . . . .

PLAN YOUR PRODUCTION
WITH PATTERSON

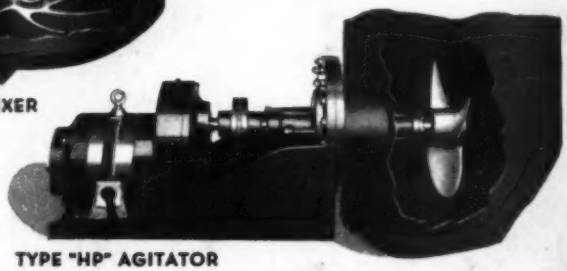


MAXILAWN SIFTER

TYPE "E" MIXER

Who can predict with accuracy the course of Paper in the uncharted future? This much we know: your Patterson Equipment will serve you dependably in war and peace, with priceless adaptability and endurance . . . vital in your planning for production at all times!

Richard L. Cameron
President



TYPE "HP" AGITATOR

TUBE MILL

UNIPOWER AGITATOR

PATTERSON
MACHINERY

The PATTERSON FOUNDRY & MACHINE CO.
EAST LIVERPOOL, OHIO, U. S. A.

6 Simple Rules

for keeping Seybold Paper Cutting Machines in good operating condition.....

Here are six simple rules followed regularly by an efficient operator of a Seybold Paper Cutting Machine:

1. **Keep It Clean!** Make it a daily habit to remove all surface dust and dirt from the machine.
2. **Keep It Lubricated!** Before lubricating, make sure that oil holes and cups are free of dirt and grit. Use *clean* lubricants in adequate but not excessive quantity. "Flooding" with oil or grease is not only wasteful but may prove harmful.
3. **Inspect Cutting Knife!** If the plant is not equipped with a Seybold Knife Grinding Machine, it is good insurance to have the knives inspected *regularly* by a local trade knife grinding shop.
4. **Inspect Clamp Pressure Mechanism.** On cutters equipped with clamp pressure indicator, the operator turns a ratchet nut and the indicator tells whether the clamping pressure will be *high, medium,* or *low.* The *medium* setting will hold the average work firmly. Failure to maintain correct clamping pressure on an automatic cutter can cause breakage of parts.
5. **Inspect Driving Clutch and Brake** regularly and maintain proper adjustment at all times. Maladjustments of these important mechanisms not only cause needless wear but excessive power is required to run the machine.
6. **Check Table** regularly for accurate alinement and inspect back gauge to make sure it is parallel with the cutting knife.

* * *

Observance of those six simple rules will not only protect Seybold Cutters from needless wear but will go far to maintain their original high standards of performance. Call your SEYBOLD REPRESENTATIVE when you require his cooperation on repair or maintenance service.

SEYBOLD

SEYBOLD SALES AND SERVICE

New York:
E. P. LAWSON CO., INC.
426 West 33rd Street

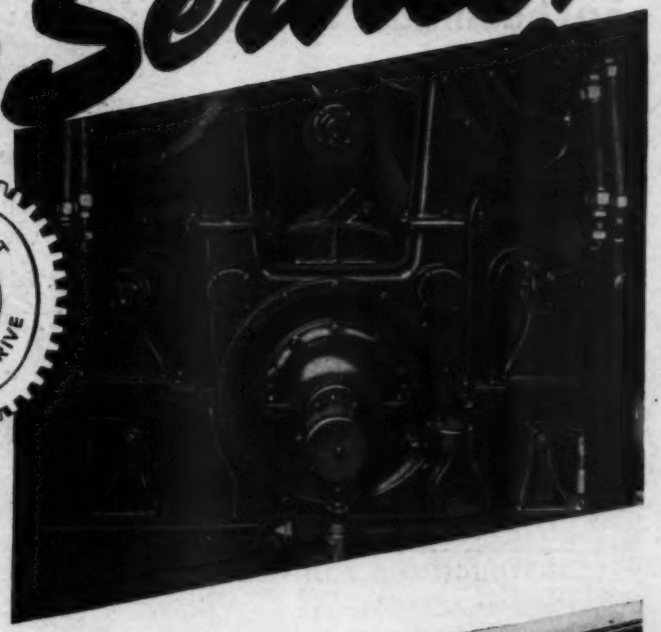
Chicago:
CHAS. N. STEVENS CO., INC.
113 West Harrison Street

Southern Sales District: HARRIS-SEYBOLD-POTTER CO., 220 Luckie St., N.W., Atlanta, Ga.

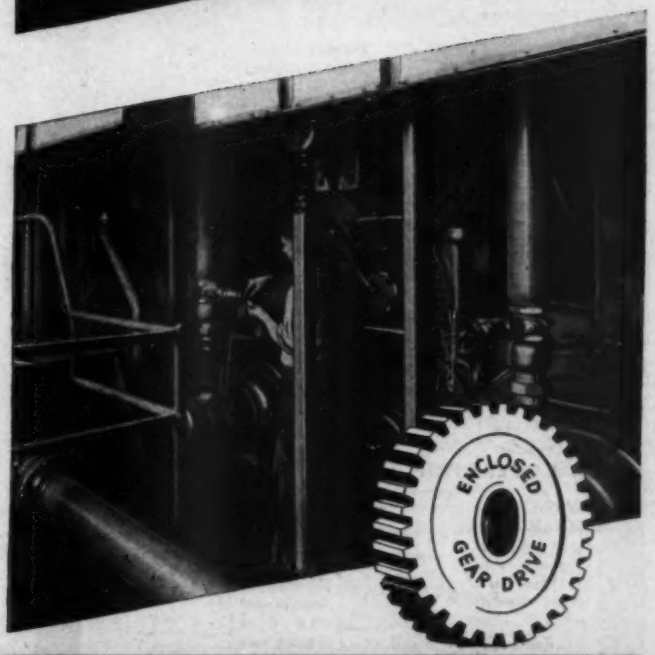
West Coast Distributor: HARRY W. BRINTHALL COMPANY, San Francisco, Los Angeles, Seattle

Canadian Distributor: HARRIS-SEYBOLD-POTTER (CANADA) LTD., Toronto and Montreal

Designed for Service!



On high speed Beloit kraft, news, tissue and book machines, a totally enclosed smooth running dryer drive is essential for good operation. The typical installations shown above are designed for speeds up to 1500 F.P.M. Their successful operation is the result of sound engineering, accurate machine work and only the best materials.



BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS. U.S.A.

Engineering MAKES THE MACHINE

BELOIT

IT'S EASY TO REGRIND THESE LUNKENHEIMER VALVES

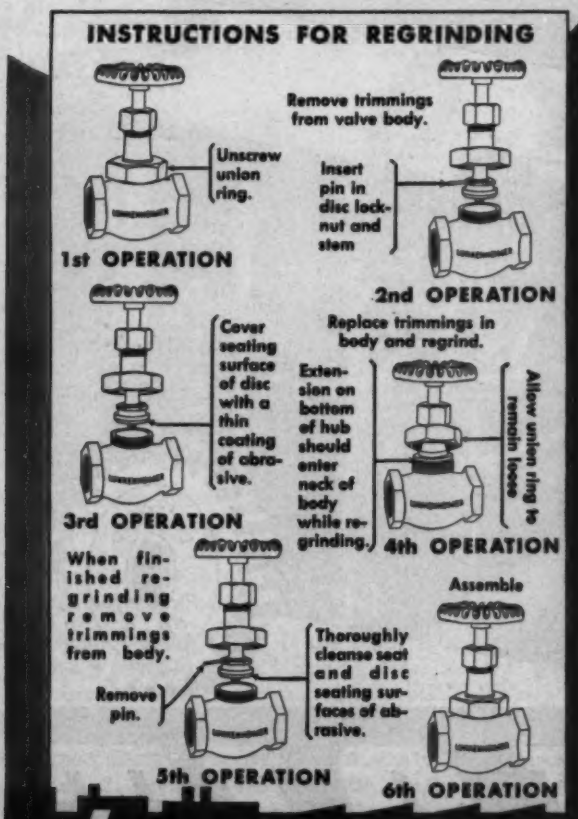
with a few minutes effort they can be made as good as new

Valve regrinding is really a simple operation—it can be done so easily and quickly without taking the valve from the line.

And in this critical period when savings in maintenance time mean so much toward total production—even the time saved in the regrinding operation over replacement is of vital importance.

All parts of Lunkenheimer Regrinding Valves are renewable. Having a few parts available in stock for an emergency can also save much valuable time.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
—"QUALITY"—
CINCINNATI, OHIO, U. S. A.
NEW YORK CHICAGO
BOSTON PHILADELPHIA
EXPORT DEPT. 316-322 HUDSON ST., NEW YORK

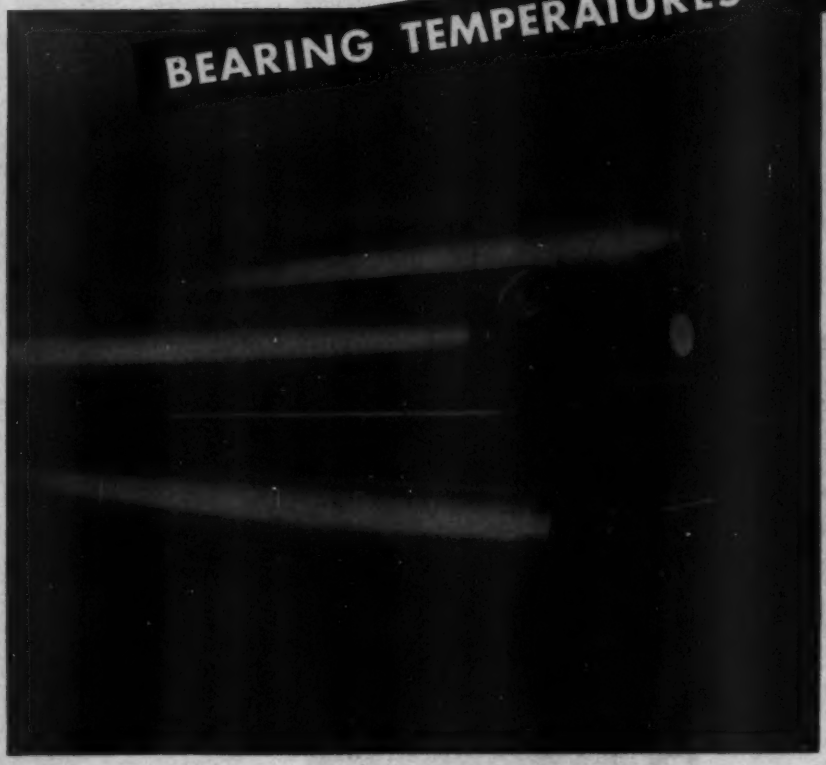

INSTRUCTIONS FOR REGRINDING
Unscrew union ring.
1st OPERATION
Remove trimmings from valve body.
Insert pin in disc lock-nut and stem
2nd OPERATION
Cover seating surface of disc with a thin coating of abrasive.
3rd OPERATION
Replace trimmings in body and regrind.
Exten-sion on bottom of hub should enter neck of body while re-grinding.
Allow union ring to remain loose
4th OPERATION
When finished re-grinding remove trimmings from body.
Remove pin.
Thoroughly cleanse seat and disc seating surfaces of abrasive.
5th OPERATION
Assemble
6th OPERATION

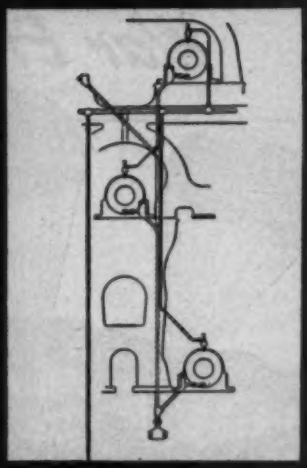
Since virtually all materials used in the manufacture of valves are on the list of critical materials, valve users are urged to furnish the highest possible preference ratings on their orders. This will be of mutual helpfulness.

LUNKENHEIMER VALVES

HIGHER SPEEDS ★ HOTTER DRUMS...

BEARING TEMPERATURES NORMAL





Oil piping arrangement on tending side of Pusey & Jones paper machine. The entire oil circulating system stays clean when Texaco Ursa Oils are used.

SCORES of paper mills faced with wartime demands for stepped-up output get this positive bearing protection by using *Texaco Ursa Oils.*

Even under today's higher temperatures and faster speeds, *Texaco Ursa Oils* resist sludging and breakdown. They keep oil lines open and assure the free flow of clean, cooling lubricant to each bearing.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred by prominent pulp and paper mills everywhere.

These Texaco users enjoy many benefits that can also be yours. A Texaco Lubrication Engineer will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distribution points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, New York.

Cars for your Car ...for your Country

THEY PREFER TEXACO

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

FOR YOUR ENJOYMENT

FRED ALLEN every Sunday night. See your local newspaper for time and station.

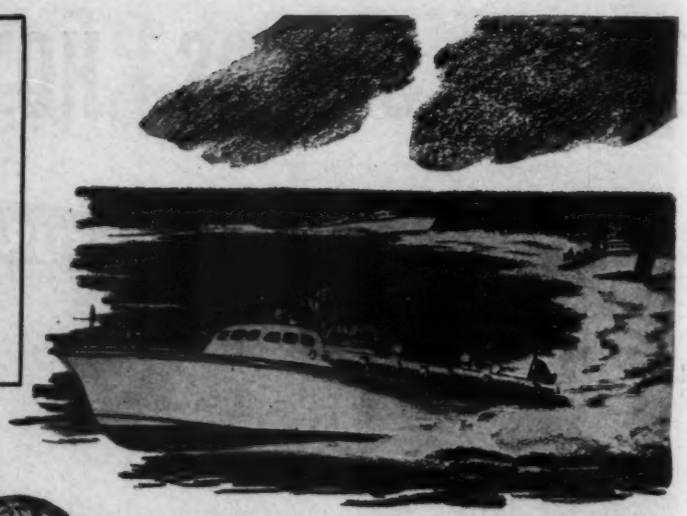
TEXACO

TEXACO Lubricants and Fuels

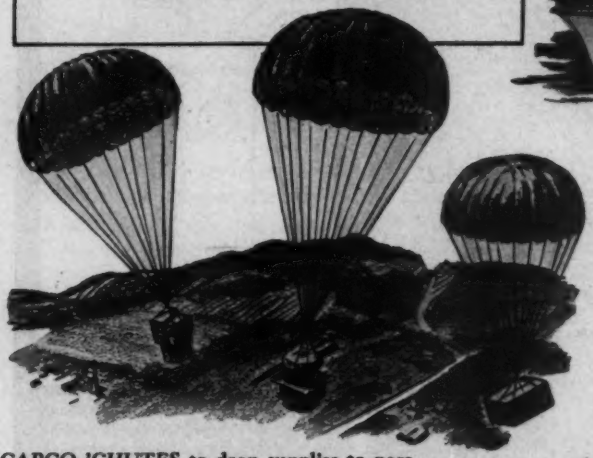
FOR THE PAPER INDUSTRY

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Caustic Soda *helps speed America's War Effort!*



"PT" BOATS clip the waves at 70 miles per hour! Speed is their chief defense. If their powerful engines fail in battle—they are dead ducks! To assure trouble-free timing, ignition systems are insulated with phenolic resins—the best non-conductor yet devised. In the synthesis of phenol by the sulfonation process, caustic soda is an essential raw material.



CARGO 'CHUTES to drop supplies to paratroops or isolated garrisons are now being made of rayon. Although still in the experimental stage, rayon promises to replace other fabrics which are needed for parachutes that carry human cargoes. Largest U. S. user of caustic soda, the rayon industry produces rayon cord for tires...high-tenacity fabric for self-sealing gasoline tanks.

BIG GUNS that can tear a tank to shreds ride on tires that are part new, part reclaimed rubber. In reclaiming rubber from used tires, caustic soda is used to dissolve the cord fabric, thus separating it from the rubber which is to be reworked.

UNCLE SAM'S "Battlewagons" pack a lethal wallop with their bristling batteries of 16-inch rifles. Breeches are loaded with smokeless powder neatly stitched in silk bags. In the manufacture of smokeless powder, caustic soda is used to purify the cotton linters.

TORPEDO PLANES are poison to enemy warships. Whether based on land or sea-roving carriers, U. S. warplanes burn staggering quantities of lubricants and high octane gasoline. In replenishing vital supplies of fuel, oil refineries employ caustic soda to remove objectionable sulphur compounds from petroleum products.

MATHIESON CHEMICALS

THE MATHIESON ALKALI WORKS, INC.

60 E. 42ND STREET, NEW YORK, N. Y.

LIQUID CHLORINE . . . SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . BLEACHING POWDER . . . HTH PRODUCTS . . . AMMONIA, ANHYDROUS and AQUA . . . FUSED ALKALI PRODUCTS . . . SYNTHETIC SALT CAKE . . . DRY ICE . . . CARBONIC GAS . . . SODIUM CHLORITE PRODUCTS

THE PAPER INDUSTRY
and PAPER WORLD

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Here's *Exactly* Why

The CONCAVE SIDE

Saves Belts-Saves Rubber-Saves Power!

Pick up any V-belt that has straight sides. Bend that V-belt while you grip its side-walls as in the picture above. You will feel the sides of the belt bulge out —as shown in Figure 1 on the right. Clearly, that out-bulge gives the belt a shape that does not fit its sheave groove.

Now look at Figure 2. There you see what happens when you bend a belt that is built with the patented Concave sides. You get a similar change in side-wall shape—but what a different result! The precisely engineered Concave side becomes perfectly straight. There is no out-bulge:—the full side-width of the belt *uniformly* grips the sheave groove wall. This means *uniform* wear—*longer* life—a saving in belts for you, a saving in rubber for the Nation. In addition, this full side-width grip on the pulley carries heavier loads without slippage—another saving of belts and a saving in power too!

Only belts built by Gates are built with the Concave side, a Gates patent.

What Happens When a V-Belt Bends

FIG. 1

FIG. 2

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

Chicago, Ill. 549 West Washington
New York City 215-219 Fourth Avenue
Birmingham, Ala. 405 Liberty National Life Bldg.
Los Angeles, Cal. 2240 East Washington Blvd.
Denver, Colo. 999 South Broadway
Dallas, Tex. 2213 Grillin Street
Portland, Ore. 333 N. W. 5th Avenue
San Francisco, Cal. 2700 16th Street

CONSERVATION starts with MODERNIZATION

Because of the stringent restrictions placed on the materials regularly used for making paper mill machinery, the Government has now recognized the need for allowing certain priorities on repair requirements.

During the time when defense priorities preclude the normal purchasing of new paper mill equipment, the approval of repair materials gives new emphasis to the importance of conservation through modernization.

Looking through your mill for old equipment needing repair is a constructive approach to keeping your mill in efficient operation condition and effecting worthwhile economies.

Make a memorandum now to let a Jones' engineer help you with a survey of your mill equipment and suggest how to profit by modernizing your old machines. Anticipating your repair work ahead of time will prevent delay in the future. A consultation infers no obligation.

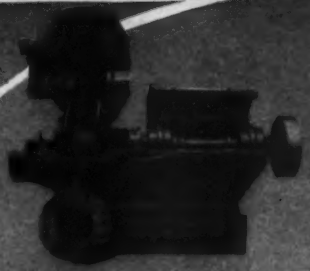
JONES IS DOING ITS SHARE TOO FOR *National Defense*

Jones

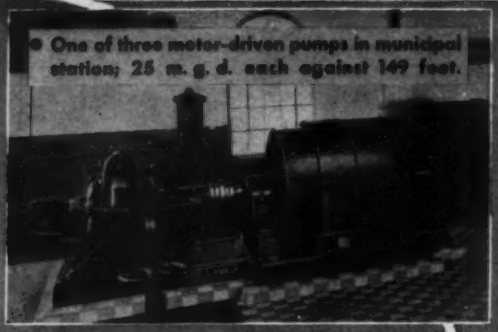
E. D. JONES & SONS COMPANY-PITTSFIELD, MASS.

Builders of Quality Machinery for Paper Mills

A DE LAVAL PUMP
to fit your job



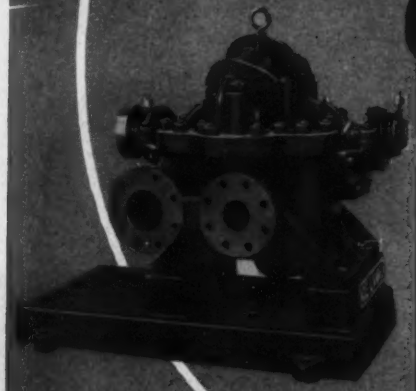
• Clogless pump, for paper pulp, sewage, etc.



• One of three motor-driven pumps in municipal station; 25 m. g. d. each against 149 feet.

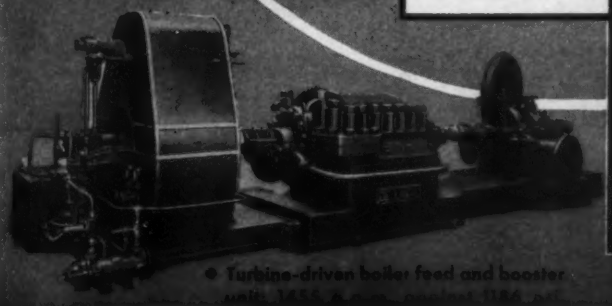
• Mixed flow pump, for large volume against low head at standard motor speed.

• Condenser circulating pump for salt water; bronze bearings, monel shaft and impeller.

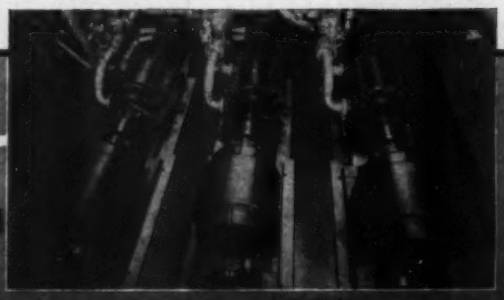


• Opposed impeller pump; compact; perfectly balanced; only two pairs of wearing rings.

INFINITE combinations of capacities, heads and speeds require careful design of each centrifugal pump to insure best efficiency and desired operating characteristics. • Where a liquid having a destructive effect on standard materials is to be handled, the life of a pump can usually be increased many times over, and its average efficiency improved, by using special alloys for casing, impeller, sleeves, wearing rings and shaft. Only by careful study of user's conditions are the best results to be obtained. • State your pumping requirements in detail so that the engineers of our Centrifugal Pump Department may give you all the benefit of their extensive experience. Ask for Leaflet P-3220.



• Turbine-driven boiler feed and booster units, 1455 R.p.m., against 1184 p.s.i.



• Multistage descaling pumps, 1200 p.s.i., each

DE LAVAL Steam Turbine Co.
TRENTON, N. J.

MANUFACTURERS OF TURBINES • STEAM, HYDRAULIC PUMPS • CENTRIFUGAL, PROPELLER, ROTARY, DISPLACEMENT, MOTOR MOUNTED, MIXED FLOW, CLOGLESS, SELF PRIMING CENTRIFUGAL BLOWERS and COMPRESSORS GEARS • WORM, HELICAL and FLEXIBLE COUPLINGS

RID YOUR PLANT OF WASTE
WASTE is an Axis ally. DM tubes will help you save time and materials for VICTORY!
If you are using tubes in the refinery, paper or chemical industries apply your operating data to this formula:
Tube Cost / Tube Life —Tube Expense
We shall be glad to supply comparative data from our file of case histories so that you can determine whether your tubes cost too much or are not good enough for the job they're required to do. In either case, waste is reducing your profits and slowing your production. Consult us without obligation.
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division
Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
SEAMLESS STEEL TUBES

EVERY DROP

removed at the Presses

SAVES STEAM

at the Dryers

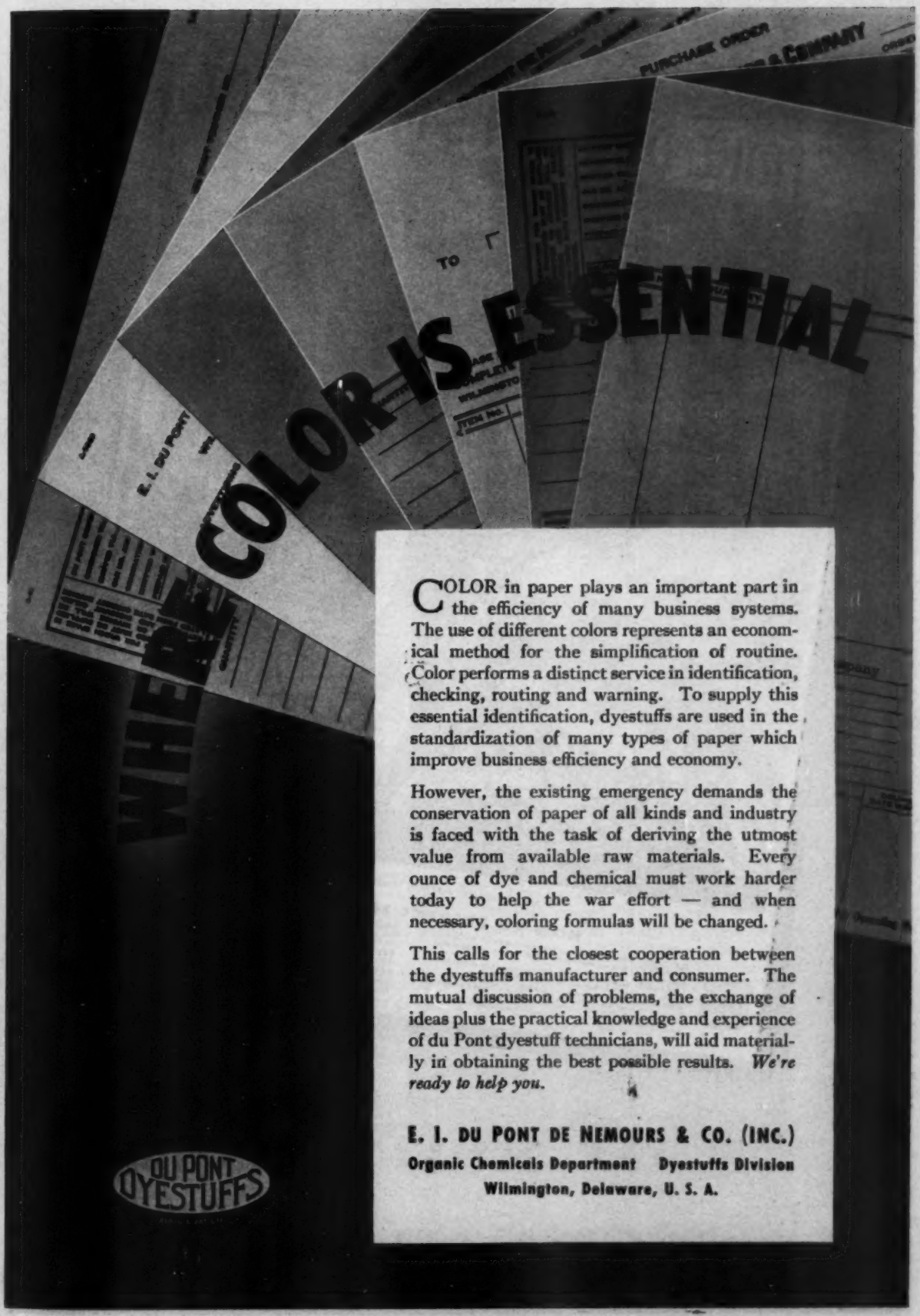
• Yes, every added drop of water removed from your sheet at the presses, relieves the load on your dryers—saves time and money—speeds production. Huyck Felts, in their extreme openness and their rugged strength are designed to meet this need, help you solve the problems of a greatly increased production program. • For speed and efficiency specify Huyck Felts.

KENWOOD WOOL PRODUCTS

F. C. HUYCK & SONS

Established 1870

KENWOOD MILLS • ALBANY, N. Y.



COLOR in paper plays an important part in the efficiency of many business systems. The use of different colors represents an economical method for the simplification of routine. Color performs a distinct service in identification, checking, routing and warning. To supply this essential identification, dyestuffs are used in the standardization of many types of paper which improve business efficiency and economy.

However, the existing emergency demands the conservation of paper of all kinds and industry is faced with the task of deriving the utmost value from available raw materials. Every ounce of dye and chemical must work harder today to help the war effort — and when necessary, coloring formulas will be changed.

This calls for the closest cooperation between the dyestuffs manufacturer and consumer. The mutual discussion of problems, the exchange of ideas plus the practical knowledge and experience of du Pont dyestuff technicians, will aid materially in obtaining the best possible results. *We're ready to help you.*

E. I. DU PONT DE NEMOURS & CO. (INC.)

Organic Chemicals Department Dyestuffs Division

Wilmington, Delaware, U. S. A.

STRIKE DOWN THIS MONSTER!
FOREST FIRES DELAY VICTORY
Reprinted from The American Weekly, May 17, 1942
HOW TO PREVENT FOREST FIRES
MATCHES. Be sure your match is out. Break it in two before you throw it away.
SMOKING. Smoke only while stopping in a safe place clear of all inflammable material.
TOBACCO. Be sure that pipe ashes and cigar or cigarette butts are dead before throwing them away. Never throw them into brush, leaves, or needles.
MAKING CAMP. Before building a fire scrape away all inflammable material from a spot five feet in diameter. Dig a hole in the center and in it build your campfire. Keep your fire small. Never build it against trees or logs or near brush.
BREAKING CAMP. Never break camp until your fire is out — dead out. Always leave a clean camp.
HOW TO PUT OUT A CAMPFIRE. Stir the coals while making them with water. Turn small sticks and drench both sides. Wet the ground around the fire. Be sure the last spark is dead.
BRUSH BURNING. Never burn slash or brush in windy weather or while there is the slightest danger that the fire will get away.
EXTINGUISH any small fire you can.
REPORT any fire you discover. Go to the nearest telephone and ask for the local Forest Ranger or Fire Warden.
Thank you.

This striking painting appeared in color on the front cover of the May 17, 1942, issue of "The American Weekly." The same issue carried a profusely illustrated authoritative article by the Honorable Claude R. Wickard, U. S. Secretary of Agriculture, in which he sounded a nation-wide warning—"the wolf of forest fire has more power to do harm in the United States than ever before in the nation's history." The Forest Service distributed 800,000 posters bearing this illustration to civic and patriotic agencies as part of a national forest protection campaign. The Government is publicizing the slogan "Forest Fires Delay Victory."

TRADE WINDS

. . Washington News . .

REVIEWING RECENT ORDERS BY OPA

What the Office of Price Administration calls "the big freeze," which put practically every commodity affecting the cost of living under a fixed price ceiling, was the subject of a series of meetings between OPA representatives, and manufacturers and merchants of paper during the middle part of May. Such meetings were held in Chicago and New York, principally, with branch meetings for distributors in every important paper distributing section. All control of paper prices is in the hands of three branches of OPA, the fine paper branch being headed by Charles J. Grant, printing papers by J. R. Atwater, and industrial papers by W. R. Adams. In general, the new ceilings are based on the prices current on March 1, but in many items the prices effective in October are those which are recognized as the new official ceiling.

Many other orders and suggestions were issued by OPA and WPB during the month. Among them are the following:

Dealers in wastepaper must register and be licensed.

Price ceilings for sanitary napkins below the prices currently in effect were fixed.

Ceiling prices on wastepaper sold to dealers for sorting are removed, but the price to consumers to be charged by dealers remains unchanged.

Advances in price ceiling for set-up, folding, corrugated and solid fibre boxes were denied after meetings of OPA officials with members of these industries.

The ceiling of $50 for standard newsprint may be raised if further investigation shows an increase to be justified by increased production costs.

Consumers' requests for wood pulp for May were about 4 per cent under the available supply, and allocations were made accordingly.

Because of the impracticability of securing return loads for trucks hauling pulpwood to the mills or collecting points, there may be a waiver of this requirement for trucks used for this purpose.

The industry is requested to make no requests for priorities for critical materials for four months, except where such priorities are necessary to keep mills in operation.

Actual chlorine allowances for May amounted to only 85 per cent of total orders, and the allocation for the month was 58 per cent of the normal use in the second quarter of 1941.

◆

CHEMICAL COTTON PULP PUT UNDER WPB ALLOCATION

Chemical cotton pulp was placed under full allocation control by Conservation Order M-157, issued May 28 by the Director of Industry Operations.

Effective July 1, 1942, no producer may deliver, and no buyer may accept, any chemical cotton pulp except as specifically authorized by the Director of Industry Operations. Exceptions to this are deliveries to the Army, Navy, Coast Guard and Maritime Commission; and small orders of 500 pounds or less to any one consumer per month, provided that the total of such small deliveries is less than 2,000 pounds a month by any one producer. June deliveries are not affected.

Chemical cotton pulp, which is chemically treated cotton linters, is pure cellulose used for manufacture of smokeless powder, rayon, plastics, and other important products. Demands for chemical cotton pulp for military purposes are growing steadily, and while no critical shortage exists at present, the allocation control announced is instituted to direct available supply into vital munitions manufacture and to prevent its use for commercial purposes where other substitutes are available. High alpha sulphite wood pulp can be substituted for many such purposes.

Forms PD-507, PD-508, and PD-509 must be filed by producer and consumer before specified dates each month, showing their inventories and their proposed action to buy or deliver pulp during the ensuing month. Each producer must notify his customers each month of the amount of pulp that he is authorized to deliver to that customer. Consumers having inventories of 1,000 pounds or more must file Form PD-508 each month, whether or not they place orders for additional deliveries of pulp.

Allocation control applies to affiliates, subsidiaries, and internal sub-divisions of an enterprise, so that a company which both produces and uses chemical cotton pulp must report its production as a separate unit. The company's requirements must also be treated separately, and it must make application for allocation of monthly stocks in the usual manner.

NEW APPOINTMENTS IN PAPER PRODS. SECTION OF OPA

New appointments to the Pulp and Paper Products Section of the OPA have been announced as follows: H. M. Gray, general superintendent of the Cherry River Paper Company, Plymouth, North Carolina, has been made special assistant to Robert M. Macy, chief of the Section. James T. Flannery, a Jersey City commission merchant, has been made chief of the Rags Unit. Theodore E. Neeley, of the Menasha Products Company, Menasha, Wisconsin, division of the Marathon Paper Mills Company, was named analyst in the Converted Products Section. Charles Allen, former analyst in the Paperboard Unit was named specialist in the set-up box field. Hugh J. Phillips, of the International Paper Company and former president of the Salesmen's Association of the paper industry, has been asked to serve as a special consultant in the Section.

Another change announced was the appointment of James A. Perkins, who for a time has been acting executive in the absence of Mr. Macy, as associate price executive. Mr. Perkins was formerly executive officer of the OPA Price Division. He is on leave from the faculty of Princeton University.

◆

CAR WASHER AT NAT'L CONTAINER DOES GOOD JOB

Employees of the National Container Corporation, Jacksonville, Florida, are very much pleased with a car washer, erected by the firm on the mill parking lot and made available to the employees for the washing of their automobiles. The company was prompted to furnish the washer because, under certain atmospheric conditions, there is some discoloration of paint on the tops of cars parked in the parking lot. The discoloration is brought about by carry-over from the bark-burning boilers, which, mixed with the smoke gases of the recovery system, settles to the ground, part of it lodging on the car tops. All that a mill employee has to do now is to drive under the washer, turn on the water, and in practically no time his car is washed. The system, according to R. H. Laftman, general manager, easily could be made automatic.

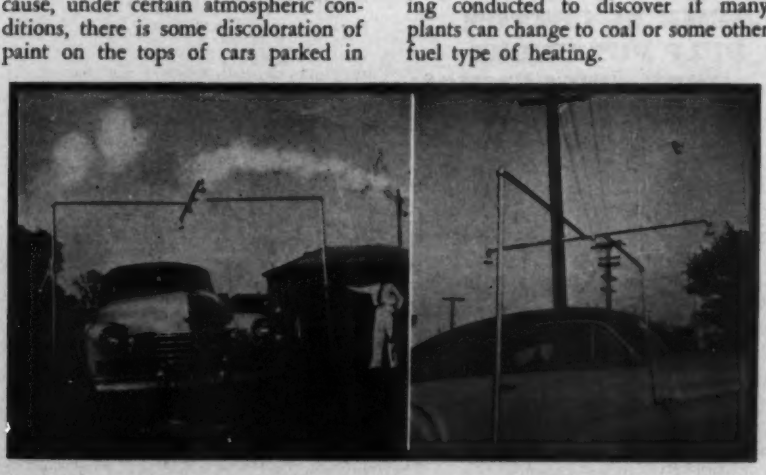
Young men who received degrees from the Institute of Paper Chemistry. Left to right: Kenneth A. Arnold, William H. Lane, William G. Hulbert, Jr., Lt. William H. Aiken, Alan P. Adrian, Joseph E. Atchison, Willard A. Schenck, and John C. Redd.

◆

CANADIAN OIL CONSUMERS LOOK TO CONSERVATION

Since almost 100 per cent of the oil requirements of the Province of British Columbia comes by tanker, paper mills located there are doing their utmost to conserve their supply.

Next fall, all homes equipped for fuel oil heating in Canada will have to convert to coal heating. Factories will be forced to cut down oil use to the minimum. Meanwhile, a survey is being conducted to discover if many plants can change to coal or some other fuel type of heating.



Ph.D. DEGREE GIVEN EIGHT AT INSTITUTE

Eight more young men hold the Ph.D. degree from the Institute of Paper Chemistry signifying the finest technical training in the paper industry. They received their diplomas at the 92nd commencement exercises of Lawrence College, Appleton, Wisconsin, on May 24. Not all will find their way into the paper field immediately, however. At least two, William H. Aiken and Joseph Atchinson, are already in the chemical warfare service, and others are apt to be. Following are the names of the new doctors, with the titles of their theses:

Kenneth A. Arnold, Syracuse, N. Y., "Flow Properties of Coating Clays at High Rates of Shear."

William H. Lane, Marshall, Texas, "A Study of the Relationship between Air Permeability and Oil Permeability of Paper."

William G. Hulbert, Jr., Everett, Wash., "An Investigation of the Degradation Products of Lignin after Irradiation with Ultraviolet Light."

Lt. William H. Aiken, Salado, Texas, "The Role of the Hydroxyl Groups of Cellulose and Pentosans in the Water-Binding Phenomenon in the Beating Process."

Alan P. Adrian, Appleton, "A New Procedure for Evaluating the Opacifying Power of Pigments."

Joseph E. Atchison, Elk Garden, W. Va., "The Effect of Cooking and Bleaching upon the Chain Length Distribution of the Carbohydrate Fraction in Pulpwood."

Willard A. Schenck, Worden, Mont., "A Study of the Nature of Lignosulfonic Acids Fractionated by Chemical and Physical Methods."

John C. Redd, Phoenix, Arizona, "The Role of Alumina in the Mechanism of Rosin Sizing."

PAPER · · · America's 6th Industry

BUNDLES FOR JAPS

(NEWS ITEM: *The War Production Board estimates that 350,000 tons of paperboard is needed for shell containers in 1942.*)

Shell containers produced by the Paper Industry are a vital link in the packaging and shipment of shells for America's armed forces.

First comes the production of armament . . . then good packing, secure loading and careful handling to make sure that it is delivered in good condition to our fighting men on land, at sea and in the air. At every step, paper and paperboard products have an important role to play.

One hundred and thirty million Americans are partners of the Paper Industry in the production of shell containers. Waste paper and pulp are the raw material for shell containers—one of the many ways in which the Paper Industry directly serves the war effort.

Puseyjones engineers are seeking every opportunity to cooperate with mills in stepping up production and improving quality of paper products needed in the Victory Program.

The new Adjustable Flow Pumps of the axial-flow type, pioneered in the Paper Industry by Puseyjones, have proved their effectiveness in many installations. Gallonage is controlled by varying the pitch of the impeller vanes, which makes possible accurate adjustment over the whole range from zero to maximum capacity with a constant speed motor.

No longer need the flow to the machine be "wire drawn" and throttled through a choking valve with attendant power losses. Pump and motor are usually installed in vertical position to save space and protect motor against damage. Adjustment is simple, accomplished by a handwheel on the operating floor with a large dial to indicate gallonage.

Keeping paper production at the point of highest efficiency is not only essential to Victory, but also best for the tremendous competition coming after the present emergency is over.

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-Making Machinery

Wilmington, Delaware, U.S.A.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

NEW WASTEPAPER DRIVE BEGUN IN BRITISH ISLES

A new wastepaper drive, with prize money totalling $50,000, began in England, Wales, Northern Ireland, and Scotland on May 1. The prize money will be distributed by the Wastepaper Recovery Association, Limited.

For the purpose of the contest, all local authorities in England, Wales, and Northern Ireland have been divided into three divisions—borough, urban, and rural councils. Competition will be kept within each division, preventing large boroughs and small rural areas from competing. Scotland has been allocated $12,500 of the prize money for a similar contest.

The judges of the contest, which closes July 31, are Sir Vyvyan Board, chairman, Salvage and Recovery Board of the Ministry of Supply; Miss Megan Lloyd George, M. P.; and S. T. Garland, general manager, Wastepaper Recovery Association, Ltd. The ultimate disposal of the cash prizes will be left to the discretion of the successful local authorities; local charities, of course, benefiting.

◆

FINANCIAL

Paper securities followed the general downward trend of the securities markets during the past month.

Albemarle Paper Manufacturing Company—Net earnings for the first quarter were $656,600 as against a net loss of $68,008 for the same period in 1941.

Allied Paper Mills—Net earnings for 1941 were $497,229 as against $340,588 for 1940.

American Writing Paper Corporation—Net profit for the March quarter was $141,587 as against $27,358 for the first quarter of 1941.

A. P. W. Paper Company—Net profit for the March quarter was $141,587 as against $27,358 in the same quarter of 1941.

Badger Paper Mills, Inc.—Net profit for 1941 was $278,902 as against a 1940 net of $252,237.

Brown Company—Net profit for the fiscal year ending November 29, 1941, was $1,484,353 as against a net loss in the previous fiscal year of $250,378.

Certain-teed Products Company—First quarter earnings were $273,000 as against $142,000 in the same period of 1941.

Container Corporation—Profit for the first quarter of 1942 was $548,646 as against $368,375 for the similar quarter in 1941.

Continental-Diamond Fibre Company—Net profit for the March quarter was $106,912 as against a profit of $130,103 for the same quarter in 1941.

Eastern Corporation—Net income for the March quarter was $166,624 as against $103,087 in 1941.

Robert Gair Company—Profit of $360,250 is reported for the March quarter as against a profit of $83,446 for the same quarter of 1941.

Great Northern Paper Company—Net profit for the March quarter was $425,880 as against $676,022 for the same quarter in 1941.

Hammermill Paper Company—Net income in 1941 was $671,401 as compared with $503,972 for the previous year.

Hinde & Dauch Paper Company—Net profit for the first quarter of 1942 was $262,537 as against $148,847 for the same quarter in 1941.

Hollingsworth & Whitney—Net 1941 profit was $1,467,379 compared with $521,538 in 1940.

International Paper Company—Net profit for the first quarter was $2,469,895 as against $3,546,822 for the same period in 1941. In reporting these figures at the company's annual meeting, President R. J. Cullen took occasion to deny reports of an impending paper shortage, saying that despite reports to the contrary, there is today a surplus capacity well above any anticipated demand.

Kimberly-Clark Corporation—Net profit for the March quarter was $553,747, an increase of about 10 per cent over the same quarter in 1941. Net income for the year ending March 31, 1942, was $2,917,009, a profit of $4.88 per share as against a profit of $2.90 for the previous year.

Mead Corporation—Net profit for the first twelve weeks of 1942 was $486,052 as against $362,037 for the similar period in 1941.

Minnesota & Ontario Paper Company—Net income for the quarter ending March 31, was $411,780 as against a net loss of $14,109 in the same quarter of 1941.

Northern Paper Mills—Net income for 1941 was $605,193.

Oxford Paper Company—Net earnings for the March quarter were $222,920 as against $212,192 in the same quarter of 1941, despite an increase in taxes of $794,435.

Paraffine Companies—Net profit for the March quarter was $498,864 as against $350,295 for the same quarter in 1941.

Puget Sound Pulp & Timber Company—Net earnings for the March quarter were $230,053 as against $226,696 for the same quarter in 1941.

Riegel Paper Corporation—Net income in 1941 was $455,102 as against $571,590 in 1940.

Scott Paper Company—Net earnings for three months ending April 4 were $441,299 as against $422,306 for the comparable quarter in 1941.

Southland Paper Mills—Profit of $248,110 is reported for 1941 as against a loss of $182,271 in 1940.

Sutherland Paper Company—Net profit for the March quarter was $244,194 as against $148,463 for the same quarter in 1941.

Union Bag & Paper Company—Net earnings for the March quarter were $763,275 as compared with $416,292 for the same quarter in 1941.

United Paperboard Company—Net profit for nine months ending February 28 was $287,511 as against a loss of $4,529 for the similar period of the previous fiscal year.

New York Stock Exchange—Stocks

	Closing Prices May 25	April 25
A. P. W. Paper Co.	1⅜	1
Celotex	6⅞	6¾
Same Preferred	69¾	70
Certain-teed	1⅞	1⅞
Same Preferred	24¼	26⅜
Champion P. & F. Co.	14½	15⅛
Same Preferred	97½	93
Container Corp.	12¾	12¼
Cont. Diamond	7½	7¾
Crown Zellerbach	10¼	10⅛
Same Preferred	77	78
Dixie Vortex	8⅛	8
Same "A"	35½	33
Robert Gair	1¾	1⅜
Same Preferred	9½	9½
Gaylord Container	9	8½
Same Preferred	*50–51	51
International Paper	9⅞	11½
Same Preferred	50¾	52
Kimberly-Clark	27¼	26⅛
MacAndrews & Forbes	16¾	15⅝
Masonite	23	24¼
Mead Corp.	6¼	6⅛
Same Preferred	*71–75	66
Paraffine Cos.	24½	21⅞
Same Preferred	*80–95	90
Rayonier	8⅜	8⅛
Same Preferred	25	25
Scott Paper	29⅛	26½
Same 4½% Pfd.	*113–116	113
Same 4% Pfd.	107½	-----
Sutherland Paper	19⅞	18½
Union Bag & Paper	8½	7⅞
U. S. Gypsum	43½	42
Same Preferred	162	164

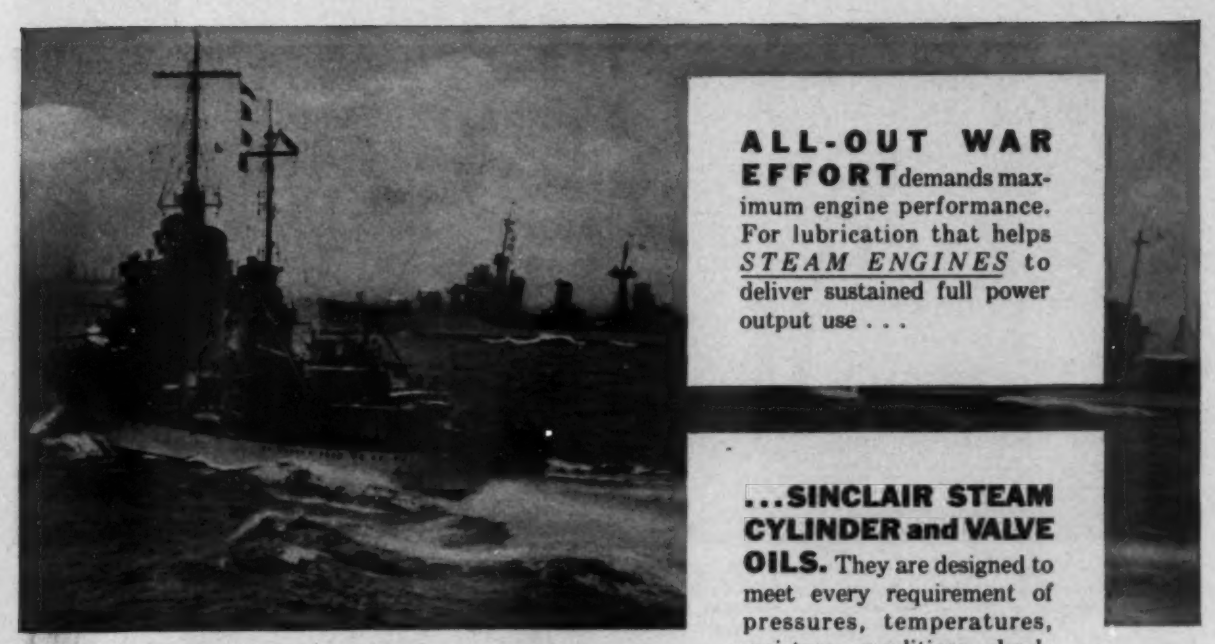
New York Stock Exchange—Bonds

Abitibi 5%	45¼	50¼
Celotex 4½%	95½	96⅜
Certain-teed 5½%	85½	86
Champion P. & F. Co. 4¾%	104⅞	105
Intern'l Paper 5%	103⅞	103½
Intern'l Paper 6%	104⅞	104¾

New York Curb Exchange—Stocks

Am. Boxboard	4⅛	-----
Great Northern	27¼	30
Hummel-Ross	4⅛	4¼
Nat. Container	8¼	8
St. Regis	1⅜	1⅜
Taggart	2⅜	2¾
United Wall Paper	1⅛	1⅛

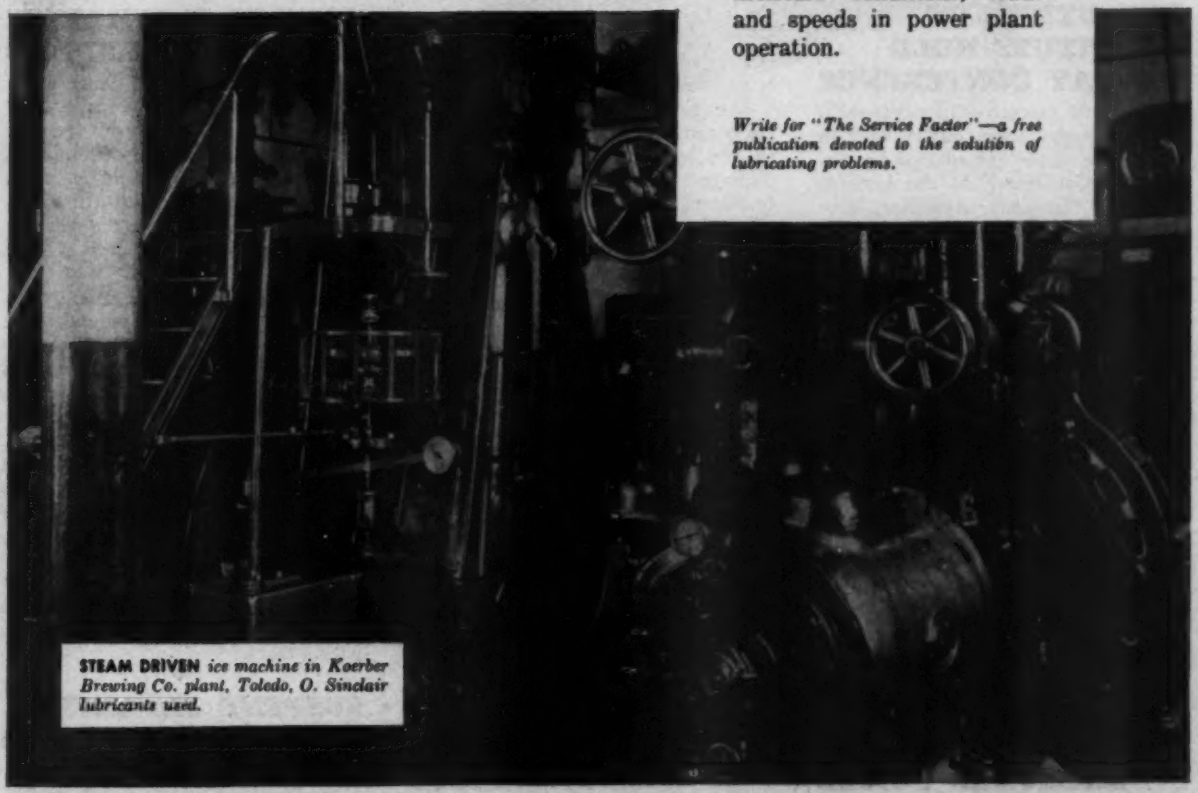
*Closing Bid and Asked Prices.



ALL-OUT WAR EFFORT demands maximum engine performance. For lubrication that helps *STEAM ENGINES* to deliver sustained full power output use . . .

. . . SINCLAIR STEAM CYLINDER and VALVE OILS. They are designed to meet every requirement of pressures, temperatures, moisture conditions, loads and speeds in power plant operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



STEAM DRIVEN *ice machine in Koerber Brewing Co. plant, Toledo, O. Sinclair lubricants used.*

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

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LEFT—Roger Steller, second year student, talks with Folke Becker (right), of the Rhinelander Paper Company, while on tour of inspection held during the annual executives conference at the Institute of Paper Chemistry. RIGHT—Miss Evelyn Kregel, technical assistant, explains operation of the electron microscope to visiting executives, R. A. Campbell (center), of the Blandin Paper Company, and C. M. Green, of the Mosinee Paper Mills Company.

EXECUTIVES OF INSTITUTE HOLD 2-DAY CONFERENCE

Over 100 executives of paper mills from throughout the country were in attendance at the annual two-day Executive's Conference of the Institute of Paper Chemistry, Appleton, Wisconsin. The regular inspection of the Institute took place on the morning of the opening day, May 13, and D. C. Everest, vice president of the board of trustees, presided at a luncheon that noon. Westbrook Steele presented a discussion of the Institute activities. The speaker was Dr. S. C. Lind, Dean, Institute of Technology of the University of Minnesota. His subject was "Scientifically Trained Man Power in the War Effort." A golf tournament was held during the afternoon.

The conference banquet was held at the North Shore Golf Club that evening, with F. L. Schuster, vice president of the Lehman Corporation, New York, speaking on "The National Economy." Ernst Mahler, president of the Institute board of trustees, presided.

◆

DENIAL OF PAPER SHORTAGE VOICED

Outspoken denial of the reports of a pending paper shortage has been voiced from many directions in the past month. That the Government statistics indicating such a situation are far out of line is stated in several of the official publications of various paper companies, and was a feature of the annual statement of R. J. Cullen, president of the International Paper Company, New York. Although the paper mills were operating well above their rated capacity for several months, the present scale of operation is now about 97 per cent.

The principal handicap to future heavy production is not in the inability of the mills to make the required tonnage of paper, but in the possibility that new regulations about the use of trucks for hauling pulpwood may tend to reduce the available amount of this essential raw material. However, the government authorities are expected to relax truck regulations sufficiently to eliminate this menace.

◆

MOVE TO PROTECT FOREST AREAS

All forest land in New Brunswick, Canada, has been declared a protected area by Honorable F. W. Pirie, Minister of Lands and Mines. From May 1 to November 1, with the exception of land licencees or owners, employees, wardens, surveyors, and licensed guides, no person may enter any forest area in the province without first obtaining a travel permit. Any person not required to obtain a permit must carry identification. The order was declared to be a fire protection measure.

The woodlands of Nova Scotia were also closed to casual travel on May 1 by the government. Here, too, fire prevention was the aim.

◆

▶▶▶ THE CONTRACT FOR an addition to the mill of the Fibreboard Products Company, Inc., Stockton, California, has been awarded. The new addition will be one story and basement and will cost approximately $85,000.

HOWARD SMITH MILLS CONTINUE TO EXPAND

Last year the Howard Smith Paper Mills, Ltd., Montreal, Canada, producers of fine papers and chemical pulp, spent more than $892,000 on increasing production facilities. This year, following a plant expansion program formulated prior to the outbreak of the War, considerably more is being expended.

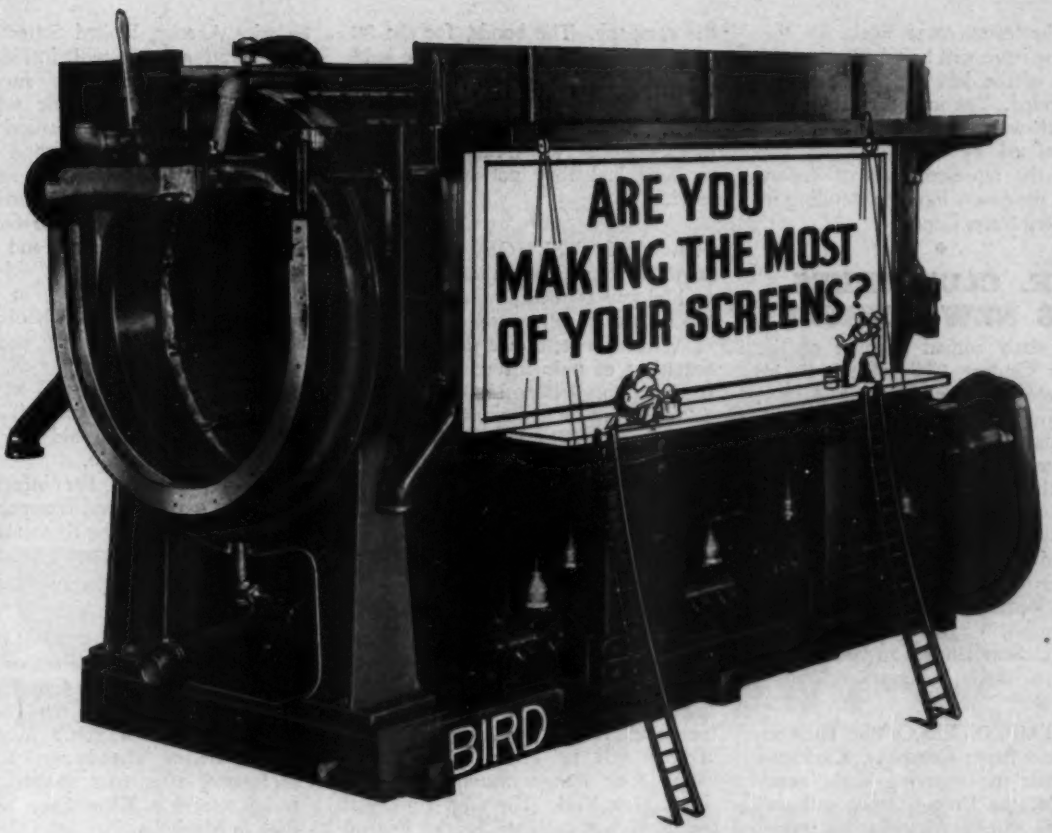
The wholly-owned subsidiary, Canada Paper Company, has undergone a plant extension at Montreal involving an expenditure of $188,000, and Alliance Paper Mills, Ltd., Merritton, Ontario, practically all of whose common stock is owned by Howard Smith, has erected a $300,000 extension to its sulphite mill. These developments are expected to greatly increase Dominion trade with the United States, and in view of the help this will give the exchange situation, the government is granting assistance in the form of special depreciation allowance in computing taxes.

◆

SUSPEND JAPANESE IMPORT DUTY CASES

Many cases now pending in the United States Customs Courts involving the dutiability of paper imported from Japan are being suspended, by request of the importers, for the duration of the War, according to the Import Committee of the American Paper Industry. The suspensions have been granted, and no action will be taken until the cases are again placed on Customs Court calendars.

In the meantime, all duties levied by Customs officials have been paid, and



Maybe you've had to change the kind, weight, grade or quantity of paper—but have you changed your screening operation along with it?

It's mighty important to have your screens *right* for the job. Don't forget you count on them to

- individualize the fibres
- remove the dirt
- deliver stock that's even in weight and free of lumps, strings and slime
- operate 24 hours a day—6 days a week
- do the job at lowest screening cost per ton

Keep an eye on your screens and whenever any question comes up remember we've been building the bulk of them for 25 years and we're likely to know the answers.

Do call on us if we can help you.

BIRD MACHINE COMPANY
SOUTH WALPOLE · MASSACHUSETTS

when the cases come again to the court, the issue will be whether or not portions of the duty already paid shall be refunded. The imports from countries with which we are at War could be dismissed by the courts on the ground the representatives of enemy country producers have no standing in the United States Courts.

◆

25-YR. CLUB TAKES IN 6 NEW MEMBERS

The sixth annual banquet of the Quarter Century Club of the P. H. Glatfelter Company, Spring Grove, Pennsylvania, was held May 19. Silver pins were awarded to six new members.

Of the fifty members of the club six are wearers of gold pins, indicating fifty years or more of continuous employment. Of these, George F. Hawkins and Phares E. Jamison have been with the company 59 years; Daniel Jamison, Virginia Ruth and William L. Stambaugh, 53 years; and Daniel S. Baker, 51 years.

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▶▶▶ EMPLOYEES OF the Thilmany Pulp and Paper Company, Kaukauna, Wisconsin, now serving in the armed forces of the United States will each receive a $50 War Bond as a gift from the company. The bonds, for the 88 employees now in service, will be held for them in a Kaukauna bank until they return to their jobs. Twenty-eight men will also receive the equivalent of vacation pay, which they would have received had they not left for war service.

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▶▶▶ THE USE OF SULPHITE WASTE from paper mills as a binder in highway construction where blacktop is used was discussed at a meeting of Wisconsin state officials and representatives of pulp manufacturers held in Madison, Wisconsin, on May 21. Such use would reduce stream pollution by pulp mill wastes, as well as reduce the amount of asphalt required in blacktop surfacing.

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WAR COURSE WILL BE OFFERED BY RANGER SCHOOL

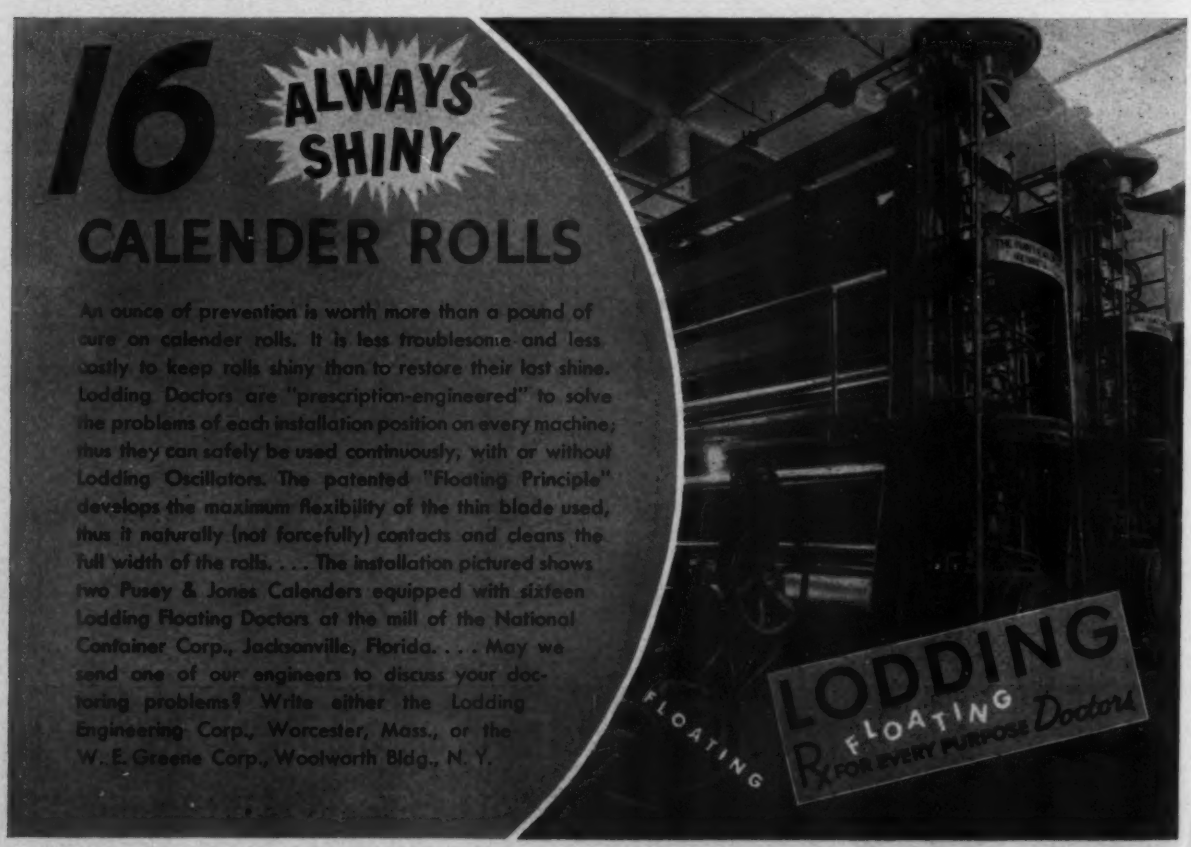
An intensive fourteen-weeks course to train men 17-19 years of age for surveying and topographic drafting, preparatory to defense work before being selected for service in the Armed Forces will be given by the New York State Ranger School at Wanakena, New York. The subject material required was outlined by the Federal Security Agency, United States Office of Education, and will include use of surveying instruments, surveying field procedure, plane-table topography, topographic and mechanical drafting, use of transit level and plane table, drafting instruments, and topographic maps. A large portion of the time will be devoted to field exercises, office occupations, and drafting-room practice.

The course, scheduled to begin June 30, is open to high school graduates, proficient in geometry and algebra, and who are physically fit. Those completing the course will meet requirements of the Federal Civil Service for junior engineering aid and junior engineering draftsman.

Tuition is free. For information regarding expenses and transportation, address inquiries to the Registrar, New York State Ranger School, Wanakena, New York.

◆

▶▶▶ IN LIEU OF MILITARY SERVICE, 1,000 conscientious objectors will work in British Columbia forests, guarding them against fire this summer. The first group numbering 67 has arrived, already well schooled in forestry after four months in the forest reserve at Clear Lake National Park in Manitoba.


16 ALWAYS SHINY
CALENDER ROLLS
An ounce of prevention is worth more than a pound of cure on calender rolls. It is less troublesome and less costly to keep rolls shiny than to restore their lost shine. Lodding Doctors are "prescription-engineered" to solve the problems of each installation position on every machine; thus they can safely be used continuously, with or without Lodding Oscillators. The patented "Floating Principle" develops the maximum flexibility of the thin blade used, thus it naturally (not forcefully) contacts and cleans the full width of the rolls. . . . The installation pictured shows two Pusey & Jones Calenders equipped with sixteen Lodding Floating Doctors at the mill of the National Container Corp., Jacksonville, Florida. . . . May we send one of our engineers to discuss your doctoring problems? Write either the Lodding Engineering Corp., Worcester, Mass., or the W. E. Greene Corp., Woolworth Bldg., N. Y.
FLOATING
LODDING
Rx FLOATING FOR EVERY PURPOSE Doctors

If you need WATER-ABSORBENCY QUALITIES . . . . *You Need-*

SURFAX W. O.

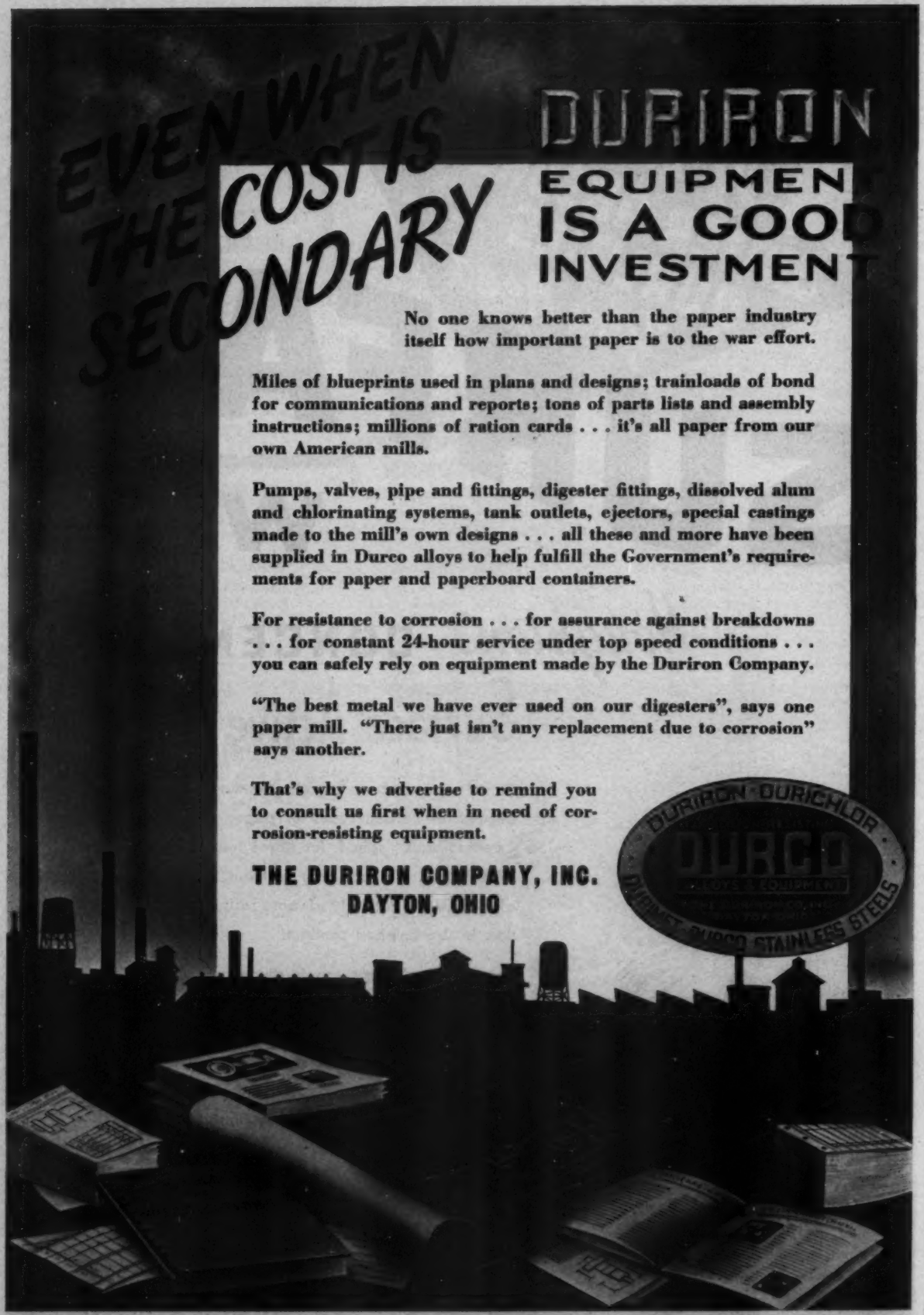
Houghton's CONCENTRATED Surface Active Agent

● Its use increases greatly the water absorbency needed in certain types of paper. We call this "wetting-back" speed, for fibres treated with SURFAX W. O. will not only wet out faster, but will also have the property of more rapid water absorption in the finished product.

This chemical helps, too, in dispersing and spreading adhesives and coatings. It thins out solution viscosities. All in all, SURFAX W. O. can be an invaluable help to your manufacturing processes. May we discuss it with you? E. F. HOUGHTON & CO., Philadelphia, Chicago or Detroit.

Another Use!

Surfax W. O. may also be used for cleaning kerosene from felts, removing oil and odor.


EVEN WHEN THE COST IS SECONDARY
DURIRON
EQUIPMEN
IS A GOO
INVESTMEN
No one knows better than the paper industry itself how important paper is to the war effort.
Miles of blueprints used in plans and designs; trainloads of bond for communications and reports; tons of parts lists and assembly instructions; millions of ration cards . . . it's all paper from our own American mills.
Pumps, valves, pipe and fittings, digester fittings, dissolved alum and chlorinating systems, tank outlets, ejectors, special castings made to the mill's own designs . . . all these and more have been supplied in Durco alloys to help fulfill the Government's requirements for paper and paperboard containers.
For resistance to corrosion . . . for assurance against breakdowns . . . for constant 24-hour service under top speed conditions . . . you can safely rely on equipment made by the Duriron Company.
"The best metal we have ever used on our digesters", says one paper mill. "There just isn't any replacement due to corrosion" says another.
That's why we advertise to remind you to consult us first when in need of corrosion-resisting equipment.
THE DURIRON COMPANY, INC.
DAYTON, OHIO
DURIRON · DURICHLOR ·
DURCO
DURCO STAINLESS STEELS

How to Save Strategic Chemicals And Still Control Slime Without Shutdowns for Cleanups

By JOHN D. FLEMING, Sales Development Department,
MONSANTO CHEMICAL COMPANY

MICROORGANISMS in a paper mill are trouble enough in ordinary times. Now that time is at a premium and mills are crowded to capacity, they spell double trouble.

If allowed to thrive unchecked they soon threaten production schedules, causing slime spots and breaks, blinded wires and clogged felts, dirty stock, clogged water lines, rotted felts and a host of other threats to a mill's profit margin.

Even in ordinary times it usually takes a good, continuous anti-slime treatment as well as good housekeeping to keep fungi and bacteria under control. Now that few mills can spare the time or the lost production for their usual periodic cleanups, the anti-slime treatment becomes more important than ever.

Fortunately, Santobrite, Monsanto's highly effective fungicide and bactericide which has been used by many leading mills for anti-slime treatment with outstanding success, is still available for that purpose. However, supplies of both phenol and chlorine, the raw materials from which Santobrite is made, are critically tight and it is essential that the most efficient possible use be made of every ounce of Santobrite.

Actually few specific suggestions can be made here on how you can get adequate protection in your particular mill with a minimum of Santobrite. You will require from 0.1 to 1.0 pound per ton of paper or pulp produced depending on the extent to which your water system is closed, the characteristics of your stock and the quality of your water supply. The cost will be from 1½ to 18 cents per ton of paper or pulp.

Some mills do not have any great amount of slime between the beater and machine and have found that they save Santobrite by adding it at the machine. Others, who are troubled by slime between beater and machine, as well as on the machine, find it necessary to start treatment at the beater.

One important characteristic of Santobrite which greatly increases its efficiency in all mills — it is not spent on organic matter as is chlorine. On the contrary, it tends to concentrate in the system.

Santobrite can be introduced into the system with about equal efficiency in powder form through standard chemical solution feeders . . . by hanging a 7-pound bag of 1-ounce briquettes at some point where the flow of water is sufficient to effect solution at the desired rate . . . or by placing briquettes in a brass wire basket receiving water from one of the showers.

The use of Santobrite is compatible with chlorine and chloramine treatment; and in cases where the results given by these treatments are not entirely satisfactory, Santobrite may be used with good advantage to supplement them.

Chemically stable, noncorrosive to metals, nonvolatile, practically odorless, Santobrite is well suited to the paper industry's need for an anti-slime treatment effective against *both* fungi and bacteria. It is available in powder or briquette form, requires no expensive apparatus for satisfactory application, and, when properly handled, its use involves no hazard to the health of mill operators or consumers of the mill product.

For experienced technical advice on how you can protect *your* mill from the ravages of bacteria and fungi with a minimum of Santobrite, inquire: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, St. Louis, Missouri.

LIKE OLD FAITHFUL YOU CAN DEPEND on

APPLETON FELTS

Paper Mills since 1890 have been depending on Appleton Felts, for they have come to learn by experience that Appleton Felts fully meet all requirements of mill production, year after year. Today's high speed production is met as easily as 1890's, because Appleton Felts have progressed with the rapid progress of the paper industry.

make APPLETON FELTS good paper

Appleton Woolen Mills

APPLETON • WISCONSIN

HE-MAN VALVES

. . . REMOTELY AND AUTOMATICALLY CONTROLLED

You don't see valves like these big 24" Miamis every day.

They're **big** . . . each designed to handle 8460 gallons at 6 ft. per second. Through them is "cycled" upwards of 100 tons of kraft stock each 24 hrs.

They're **easy to operate** . . . even though controlling such a flow is no ordinary job. They are all on one system and remotely controlled. Furthermore, operation is automatic with amount of cycling needed predetermined.

Maybe you never used such big valves due to the difficulty of opening and closing the older types. These Miami valves, however, were installed **after** a trial valve had met every test. That's because we know big valves . . . know how to make them operate smoothly. **Shartle Brothers, Middletown, Ohio. Division of the Black-Clawson Co.**

SHARTLE BROTHERS

NOTES ON CONSERVATION OF CRITICAL MATERIALS... No. 3

Every pound of critical materials, today, must be made to serve to the last ounce. Worn pump shafts can be made into nuts, bolts, valve stems, nozzles; beater bars into jordan bars; discarded castings can be remelted.

Among the metals which can be used again in such ways are Monel, Nickel and Inconel. Call on the ingenuity of your Master Mechanic and his machine shop crew whenever these materials have served their original purpose. Many are the uses to which a machine shop can turn metal which is still of sound substance.

Monel, Nickel, Inconel and other INCO Nickel Alloys are readily machinable. Because of their high strength, ductility and toughness, machining procedures differ from those employed for metals which are not so usefully tough. Good results are obtained through use of the right combinations of tooling, speeds, feeds and cutting compounds. Recommended practices are detailed in Bulletin T-12, "Machining Monel, Nickel and Inconel."

Among the important factors are those outlined below. For full information refer to Bulletin T-12, a copy of which will gladly be mailed on request.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street **New York, N. Y.**

MACHINE SHOP PRACTICE applying to INCO Nickel Alloys

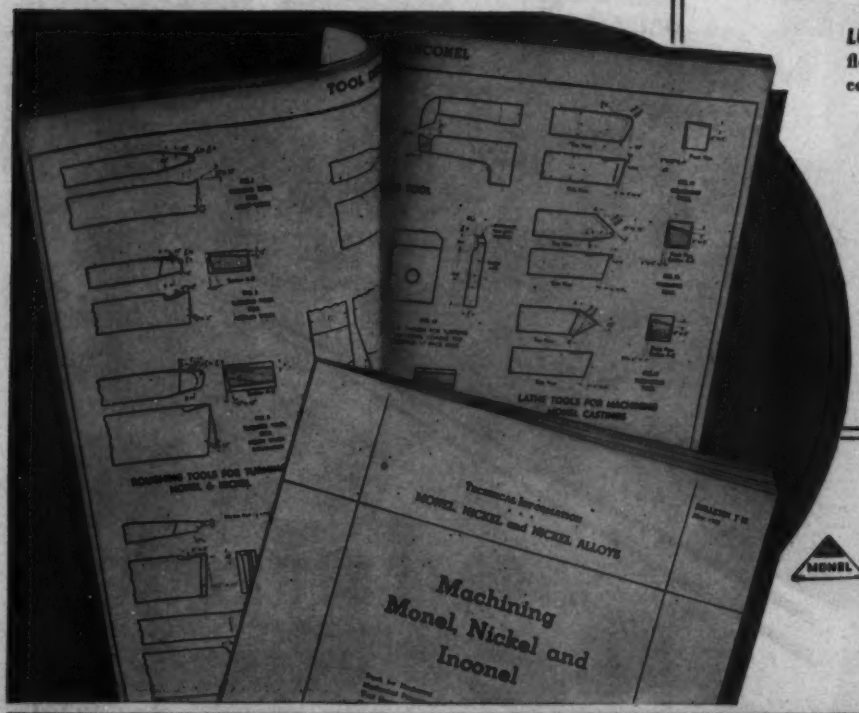
TOOLS—Use high speed steel or super high speed steel cutting tools properly ground and keep cutting edge keen.

SET UP—Put work on sturdy machines and support tools rigidly in tool post. Set cutting tool in center line of work.

LUBRICANT—Keep work well flooded with sulfurized cutting compound.

FEEDS and SPEEDS—Follow feeds and speeds suggested in our Bulletin T-12.

FINISH—Have good finish on machine parts which are to withstand corrosive conditions.



"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

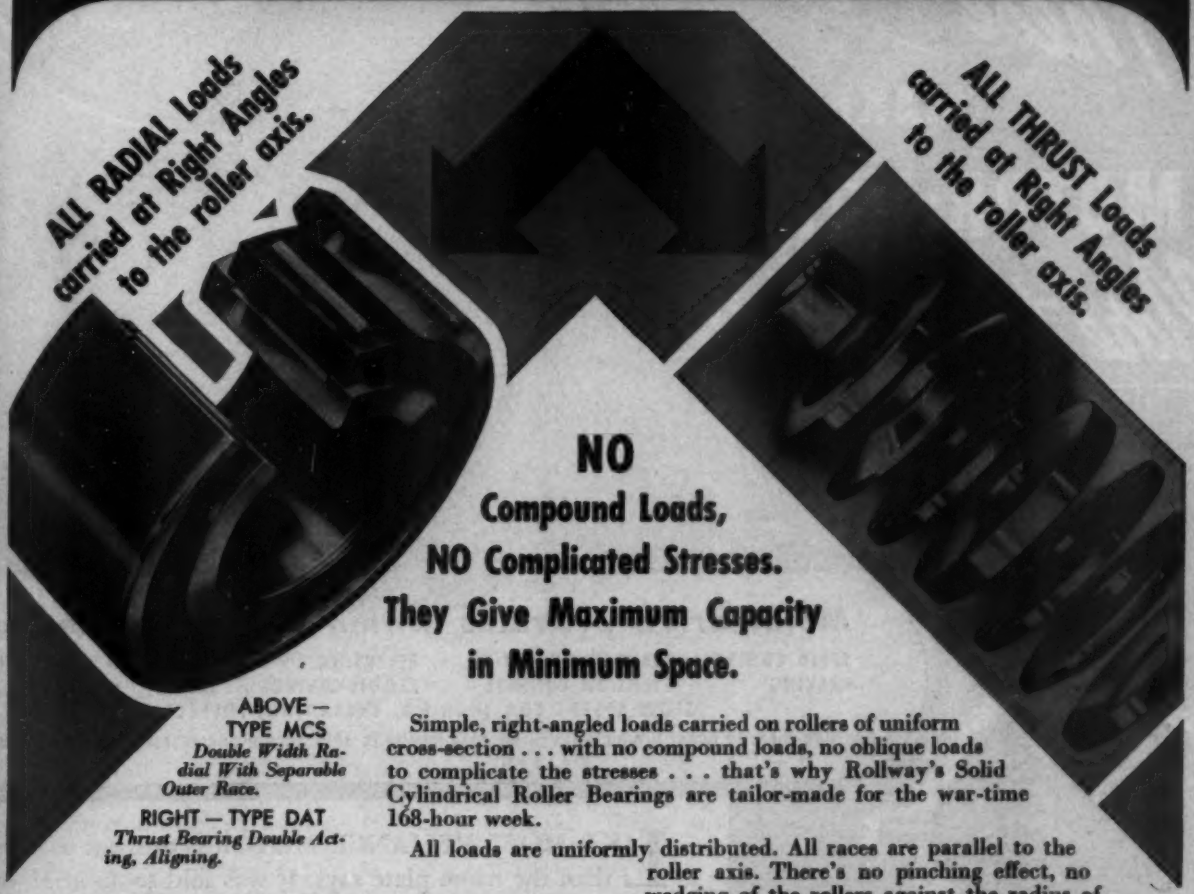
INCO NICKEL ALLOYS ARE YOUR ALLIES

MONEL • "K" MONEL • "S" MONEL • "R" MONEL • "KR" MONEL • INCONEL • NICKEL • "Z" NICKEL

Sheet... Strip... Rod... Tubing... Wire... Castings

ROLLWAY'S RIGHT-ANGLED LOADING

Keeps Bearings Rolling 168 Hours a Week



NO
Compound Loads,
NO Complicated Stresses.
They Give Maximum Capacity in Minimum Space.

ABOVE —
TYPE MCS
Double Width Radial With Separable Outer Race.

RIGHT — TYPE DAT
Thrust Bearing Double Acting, Aligning.

Simple, right-angled loads carried on rollers of uniform cross-section . . . with no compound loads, no oblique loads to complicate the stresses . . . that's why Rollway's Solid Cylindrical Roller Bearings are tailor-made for the war-time 168-hour week.

All loads are uniformly distributed. All races are parallel to the roller axis. There's no pinching effect, no wedging of the rollers against the radius of the race. Sliding friction and wear-back of roller ends are held to a minimum.

Splitting the load into components of pure thrust and pure radial makes for compactness, hence you can change your present bearings to Rollway's of higher capacity rating in the same dimensional limits.

In no other type of thrust bearing can so much capacity be obtained in so compact a form. Short, accurately dimensioned rollers insure free rolling and low torque, regardless of the oil-film. And staggered position of the thrust rollers equalizes the distribution of wear.

STANDARD SIZES FOR MOST APPLICATIONS

Rollway's unusually wide range of series and types provides standard metric dimensions and tolerances for practically every design, providing both replacements and change-overs at lower cost. Send us your drawings—particularly your conversions—for free engineering analysis and bearing recommendations, a free service that's worth real money to you.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

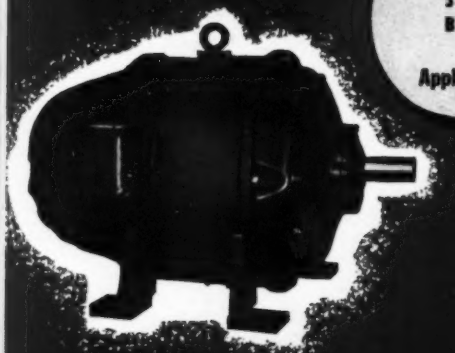
BUILDING HEAVY-DUTY BEARINGS SINCE 1908 — **BEARINGS**

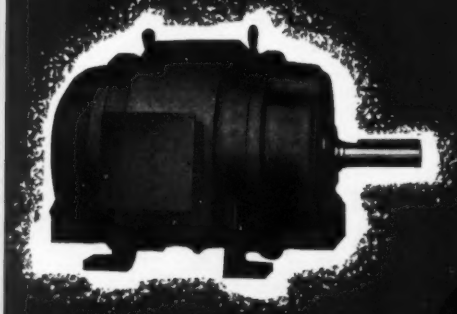
These 2 Words MAKE MOTOR-DRIVE More than POWER

Motor-drive provides within itself a means of:

SPEED CONTROL · TANDEM OPERATION · REVERSING · CONTROLLED ACCELERATION
BRAKING · TENSION CONTROL · REMOTE CONTROL · SAFETY
SLOW SPEEDS FOR INCHING, THREADING, INSPECTION

Applying them to boost production and improve quality is APPLICATION ENGINEERING. That's our business.





LIKE MOST RELIANCE MOTORS, this one is more than the name plate says. It was sold *to do a job*—to go beyond providing power. It will take a definite part in a production process by performing functions such as:

Reliance "selling" is "engineering." It is cooperation in answering the question, "What can we get the motor to do besides supply power?" When you have plans afoot requiring new machines or processes, invite a Reliance man to sit in. He can help you get the most from the production aids which are inherent in motor-drive.

RELIANCE ELECTRIC & ENGINEERING COMPANY
1088 IVANHOE ROAD • • • • CLEVELAND, OHIO

BIRMINGHAM • BOSTON • BUFFALO • CHICAGO • CINCINNATI • DETROIT • GREENVILLE, S. C.
HOUSTON, TEX. • LOS ANGELES • MINNEAPOLIS • NEW YORK • PHILADELPHIA • PITTSBURGH
PORTLAND, ORE. • ST. LOUIS • SAN FRANCISCO • SYRACUSE, N. Y., AND OTHER PRINCIPAL CITIES

RELIANCE A-C D-C MOTORS

Editorial

Where Are the Shortages?

▶▶▶ CERTAINLY NOT NOW IN PAPER.

There has never been a shortage of paper in any division of the industry. The over-all supply of both paper and pulp, in spite of the loss of the imports of both from Scandinavia, has at all times been ample.

In 1941, there was a consumptive demand for twenty-one million tons of paper products and the demand was fully supplied. All paper product consumers received more paper that year than they had in 1940 and, in addition, all government orders were filled without delay.

Following the Pearl Harbor attack and the declaration of war in early December, 1941, large numbers of orders were hectically placed with any and every mill that would take them, by both civilian and governmental agencies.

The mills worked overtime to service this extraordinary amount of demanded tonnage.

In late, January, 1942, the restrictions by the War Production Board against inventories caused converters, merchants, and consumers to liquidate their stocks and to cease placing further orders.

The demand for cash to meet the very heavy income tax payments in March further augmented the disposals of paper stocks. On top of all this, the misguided appeal to consumers of paper products to curtail legitimate uses of paper and for the collection and accumulation of waste papers, as being a sure fire exhibition of patriotism, served to back up production at the mills. In the case of waste paper, this resulted in mills refusing to take it in because of lessened demand, and no room for storage. The last week in May, Commissioner Lessing Rosenwald wrote to all state salvage chairmen calling off waste paper collections except in those areas where mills were willing to accept them.

Thus, within sixty days after the War Production Board announced the appointment of the Pulp Allocation Committee to ration pulp to the paper mills (due to a shortage of wood pulp), the mills are long on raw material pulp, but woefully shy of orders for paper.

Some divisions of the industry are in dire need of orders and are bitterly complaining over the diminishing demand for their papers, brought about by the premature propaganda of a shortage in paper products—which at no time has existed. The board division eases along at 82 per cent of capacity, against a 100 per cent demand in January.

Nevertheless, there is a possibility that a curtailment of paper production may transpire later in the year. However, such an eventuality would be due to (1) lack of transportation; (2) shortage of power; and (3) a lack of critical materials such as copper, rubber, aluminum, steel, brass, etc. The paper industry has maintained its capacity to supply every pound of paper needed for war purposes, and it has continued to supply the civilian demand as well.

Whatever the future holds or develops, the paper industry will be found capable of adjustment to any and all conditions. It can assure the country that it has met every challenge for increased production one hundred per cent, and that it has more than sufficient productive capacity to meet all future demands for paper for war purposes. No shortage in paper yet.

Business Contacts

▶▶▶ NEXT TO THE PRODUCT or service being sold by every company there probably is nothing quite so essential to the profitable operation of a business as its contacts with customers and prospects. These contacts may be made by salesmen, by direct mail advertising, by publication advertising, or by a combination of such media.

Whichever means of contact used—whether individual or a combination—depends considerably upon the experience of each firm. The successful practice of one firm might be unsuccessful if duplicated or even used in part by a competitor. Yet, without its particular contacts, the successful firm soon might be forgotten.

A foreign visitor to the office of this publication several years ago emphasized the need for contacts in business. He was interested in pulp and paper mill machinery as made by firms in the United States. He was too far away to be visited by salesmen representing such firms, so his only contact with them was by the advertising received directly from them or carried by them in the business papers of the field, of which he was a devoted reader.

Due to the economic slump then existing, this sort of promotion activity previously had been cut out entirely by several of the firms known only in this way to the visitor. Therefore, one of his first remarks was, "Are such and such firms still in business? I haven't seen any of their advertising lately." To be sure, most, if not all, of the firms mentioned by him were still in existence, but how was he to know. They had failed to keep contact, and, except for his trip to the United States at the time, they would have been forgotten completely by him within a comparatively short time.

Although the present business situation, in general, is in reverse to that of the period just mentioned, many firms no longer able to receive orders from their old customers because of war work, are failing to keep contact with them. They are stopping their advertising; they are having salesmen call less frequently, if at all. If this practice continues for some time, what will be the security of these firms when peace comes? The natural thing for them to do then will be to go back to the market or markets served by them before the War. Will they find their places filled by others? Will their names be forgotten?

To maintain good will, to insure continuation of your business, to do your part in the winning of economic security for the people of the United States after the War, follow the suggestion made in a recent piece of advertising copy of Kimberly-Clark Corporation, paper manufacturers of Neenah, Wisconsin—"Let There Be No Blackout of Your *Name!*" Keep your contacts.

Replying to yours- - - -

Somewhere in the U. S. A.
April 21, 1918

"Dear Perplexed Salesman:

"Your letter of April 19 came in yesterday's mail. I've waited until today to reply because I wanted time to do some thinking. I want to answer the questions you ask. But more than that, I want you to understand the reasons for the things that are happening in our business today.

"You have asked me four important questions:

"1) How soon can your customers expect delivery on certain orders they have placed?

"2) Why should you call on customers when you haven't any product to sell?

"3) What are you going to say to these customers?

"4) Why do we continue to advertise when we can't deliver the goods?

"First of all, let's take a look at the situation as a whole. Right now this country is facing a great national emergency. As you know, the Government is spending huge sums of money for war materials. This money is making more jobs for more people. And when people have more money, they do more spending. Business as a whole is better now than it has been for years. This is a period of prosperity.

"For the first time in the history of our business, we are in a position where we can't manufacture and deliver our products as fast as people buy them. We are oversold. And I'll tell you why we haven't been able to turn out goods as fast as we'd like to. Certain raw materials that go into our products are needed for the manufacture of defense supplies. And the companies that are working on war orders are buying these materials in great quantities. The supply just doesn't meet the demand.

"Another thing that has slowed us up is lack of manpower. Labor is hard to get. Men are wanted for defense industries. Many are going into the army. So, from a standpoint of producing the goods, we've had plenty of problems. We're working day and night to solve these problems, but it takes time and patience. Believe me, we're as anxious to deliver as you are to sell. In a few more weeks we hope to be caught up. In the meantime, you must understand and be certain that your customers understand that we're doing our very best.

"Now why should you keep calling on your dealers when you haven't any product to sell? Here's why. Because you have a product to sell. That product is this company, its name and its reputation.

"And right now, when you can't promise delivery, it's the most important product in the world. Why? Because this national emergency is only temporary. Some day—a year, two years, three years from now—normal times will return. People will go on living, thinking, and acting as they did before. Yes, and they'll go on buying too, and we want them to go on buying our product then as they do now. So your job is bigger now than it has ever been.

"You must keep this company and its products everlastingly in the minds of your buyers. That means contacts and more contacts, whether you can promise delivery or not. You have a new sales story to tell. It's the story of this company, what it stands for, and what it is trying to do. Be certain that you get this story across clearly to your dealers. It's your sales insurance for future business.

"Now about our advertising. Why advertise when we can't deliver? For the best reason in the world. Because this company is in business to stay. I say again that this national emergency is only temporary. But what's going to happen when it's over? People still will have definite needs for the products we make. Do you want these millions of buyers to forget us and our line? If they do, we'll all be out of jobs.

"Advertising is more important right now than ever before. It has a bigger job to do because it must keep people sold on our products, even though they can't buy them. We're not only going to continue our advertising—we're going to do even more. It's another form of business insurance.

"You keep your dealers sold. Our advertising keeps our customers sold. Sales and advertising must and will work together for the future prosperity of this company and its employees.

"You will hear about companies whose salesmen have ceased to make their regular calls. These same companies have stopped advertising. Our policy is different. We believe that in the long run we will prosper while they will fail.

"Keep all of these things in mind. Remember, you're selling for the future as well as for right now. And don't pay too much attention to this 'depression after the boom' talk. If you do your job as we intend to do ours, there'll be no depression for us.

Very truly yours,

Your Salesmanager"

Get EXTRA Service Values with LINK-BELT CALDWELL HELICOID CONVEYORS

The Type to Use

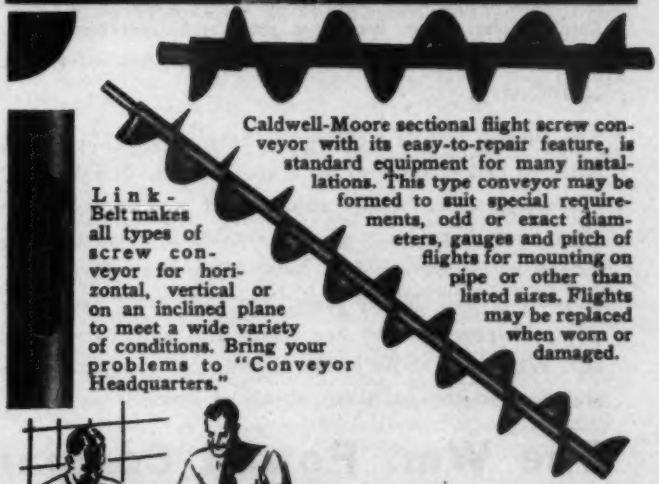
Caldwell Helicoid conveyors have been the standard in pulp and paper mills for years. Link-Belt has steadily improved Helicoid conveyor and accessories since pioneering the use of this type of conveyor.

Why It Is Outstanding

Genuine Helicoid flighting is one continuous piece, rolled from a single bar on special machinery. To the obvious advantage of the complete absence of joints and fastenings are added the special Link-Belt methods of straightening, fitting, welding, so flight and pipe become in effect one piece, free from rattle, loosening or eccentricity. Cold rolled flights are remarkably smooth and hard. Streamlined forged lugs welded to pipe and flight at both ends take thrust and add rigidity. Solid steel bushings pressed in pipes add thickness and strength at coupling points.

How to Apply Power

Direct drive through one of several types of Link-Belt reducers available, or by countershaft, depending on local conditions. Can be fitted with Link-Belt parts completely—an obvious advantage. Trough ends with plain or anti-friction bearings, outboard bearings and mitre gears are all shown in the Link-Belt catalog.



Caldwell-Moore sectional flight screw conveyor with its easy-to-repair feature, is standard equipment for many installations. This type conveyor may be formed to suit special requirements, odd or exact diameters, gauges and pitch of flights for mounting on pipe or other than listed sizes. Flights may be replaced when worn or damaged.

Link-Belt makes all types of screw conveyor for horizontal, vertical or on an inclined plane to meet a wide variety of conditions. Bring your problems to "Conveyor Headquarters."

Link-Belt experienced engineering . . . manufacturing ability . . . and facilities . . . combine to give you a cooperative service that is outstanding in screw conveyor production. We serve pulp and paper mills from stocks at our plants, warehouses and distributors.

LINK-BELT COMPANY

Engineers and Manufacturers of
Materials Handling and Mechanical Power Transmission Machinery Since 1875

Chicago, Caldwell-Moore Plant, 2410 W. 18th St.
Indianapolis Philadelphia Atlanta Dallas San Francisco Toronto
Offices, warehouses and distributors in principal cities

8947-B

LINK-BELT Screw CONVEYORS

LINK-BELT EQUIPMENT INCLUDES: Chains and attachments of all types—Malleable Iron, Promal and Steel . . Log Up-Hauls . . Slasher Table Chains . . Sorting Table Conveyors . . Log Stackers . . Crawler and Locomotive Cranes . . Coal and Ash Handling Equipment . . Elevators and Conveyors of all types . . Vibrating Screens . . Car Spotters and Haulage Systems . . Water-Intake Screens . . Roto-Louvre Heat Dryers and Coolers . . Paper Roll Handling Equipment . . Silverstreak Silent Chain Drives . . Silverlink Roller Chain Drives . . P.I.V. Gear and V.R.D. Variable Speed Transmissions . . Speed Reducers . . Sprockets . . Gears . . Pulleys . . Couplings . . Clutches . . Friction Fighter Ball and Roller Bearing Units . . Babbitted and Bearings . . Base Plates, etc. Send for General Catalog No. 800.

Keep 'em Flowing

The steady, irresistible flow of American War Production is what makes it invincible. The flow of the liquids and gases that play such an important part in all modern production, to be effective, must be perfectly controlled. To keep them flowing under perfect control is our job. We have been at it just four years short of a century. During that time we have met and overcome many a problem concerned with the controlled flow of the fluids of industry.

The Powell line is a collection of valves which have been built to order, each to do a special job. The Powell engineering staff, in the solution of new problems, year after year, have built up the Powell line valve by valve. Today it covers the full range of industry's needs. Tomorrow it will do the same. For industry's problems are our problems and we are ready and able to work them out. When you think of the liquids and gases of industry, and how to control them, think of Powell.

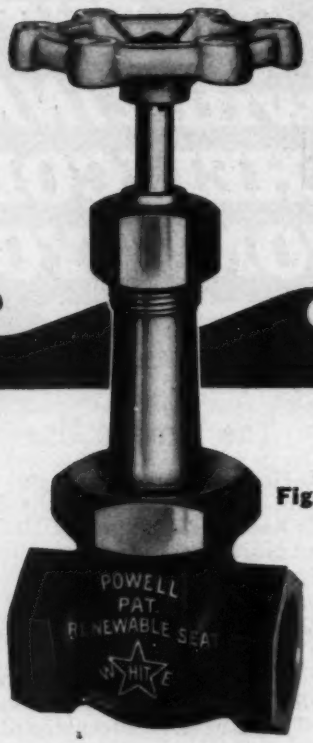


Fig. 1375

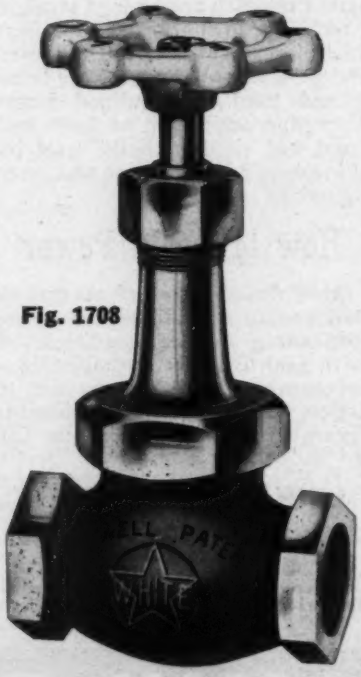


Fig. 1708

The Wm. Powell Company
Cincinnati, Ohio

Fig. 1708

A 200-pound Bronze Globe Valve, with screwed ends, Union bonnet, renewable seat and regrindable, renewable nickel-bronze semi-cone plug type disc. Available in sizes from ¼" to 3".

Fig. 1375

A 200-pound Bronze Gate Valve, with screwed ends, Union bonnet, and renewable nickel-bronze disc. Sizes ¼" to ¾" equipped with taper wedge solid disc; 1" to 3" with taper wedge double disc.

These valves, although designed and sturdily built to give long, dependable service, can be easily and quickly repaired, if necessary. Merely regrinding the seat, or renewing the seat and disc makes them practically as good as new. Can be repacked under pressure when wide open.

POWELL VALVES

These Norwood Filters at Fox River Paper Company's Fox River Mill are in constant operation. Notice the scum on top of the water before filtration.

The Norwood Filters at Fox River's Telulah Mill were installed nearly a quarter of a century ago. Still giving dependable service.

BETTER PROCESS WATER

Fox River Paper Company Never Shut Down Their Norwood Filters

THE Fox River Paper Company of Appleton, Wis., makes fine rag content bonds, writings, ledgers and drawing paper . . . takes its process water from the widely known Fox River (and everyone knows how tough that water is for fine paper making) . . . but doesn't have to worry about the quality of this process water because all objectionable content is removed by dependable Norwood Filters.

The Norwood Filters in their Telulah Mill have been in operation since 1920 and have a capacity of 2100 gallons per minute, while the 12-bed installation in their Fox River Mill have been in operation since 1925 and filter 4200 gallons per minute.

A recent check-up of these filters showed that they are in constant operation, and that throughout the years Norwood's service has been satisfactory. The Production Manager of Fox River Paper Company likes Norwood Filters. He finds them dependable, with low maintenance and operating costs.

You, too, will like Norwood Filters. Investigate Norwood Filters now. If you are having any trouble with your sheet which may be traceable to water troubles, write Norwood's engineers today. They'll give you real cooperation.

Send For Engineering Data Units

We have helpful Engineering Data Units covering Norwood Filters as well as Filter Supplies and Accessories. Ask for units covering any Norwood Equipment you are interested in, or write for Portfolio F for a complete set of data units on Norwood Filters.

WE CAN DELIVER We can still deliver your Norwood Filters within a reasonable length of time, but the sooner you place your order, the quicker you will get delivery. Place Your Order Now.

Get a Good Start And a Good Finish With

NORWOOD

WATER FILTERS AND PAPER FINISHING MACHINERY

The Norwood Engineering Company

16 No. Maple St., Florence, Mass.

Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

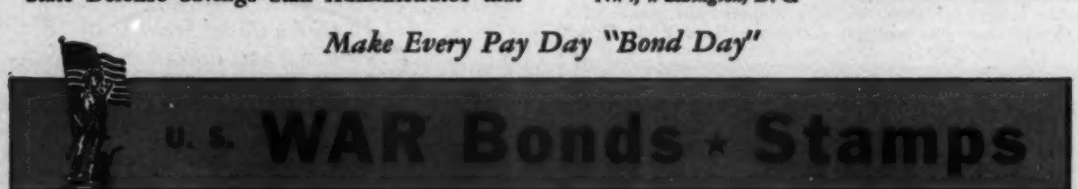
IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly,* every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, TIME IS SHORT.

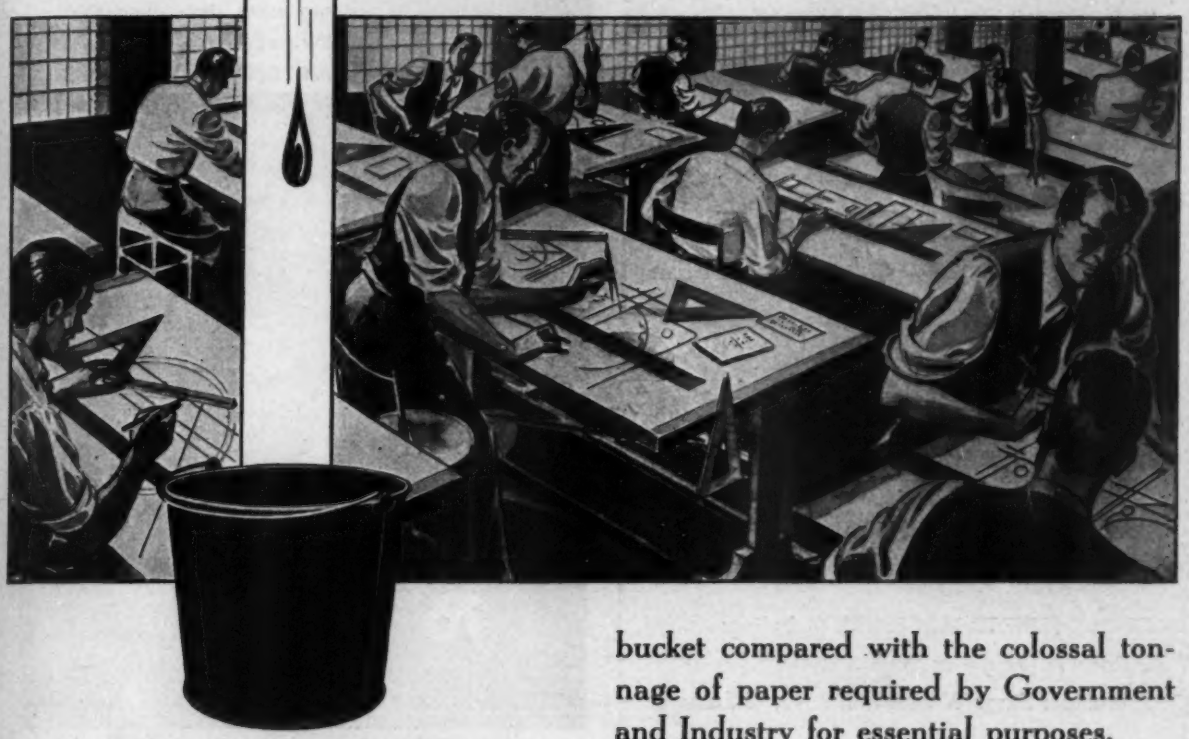
Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

Make Every Pay Day "Bond Day"



This Space is a Contribution to Victory by THE PAPER INDUSTRY AND PAPER WORLD

A Drop in the Bucket



...for All-Out War Production

According to TIME, March 23, "The drafting room of The Ford Motor Company used five miles of blue print paper a day, seven days a week, for six months." Big as this seems, it is only a drop in the bucket compared with the colossal tonnage of paper required by Government and Industry for essential purposes.

Much of the blue print paper now in use was formed on Hamilton Felts. Hamilton Felts are as necessary to efficient paper machine operation as are rubber tires to automobiles. This explains why the Government has rationed wool as it has rationed rubber. Because they are essential, paper maker felts have priority on the best of wools.

From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

IMPROVED PAPER MACHINERY CORPORATION

NASHUA, NEW HAMPSHIRE

CONTINUOUS ROTARY VACUUM FILTERS, including:

Black Liquor (Brown Stock) Counter-Current Washers

Bleached Stock Washers

Sheet Forming Machines

Sludge Filters

Save-alls

Special Purpose Filters

FLAT SCREENS—IMPCO Low Type with Dunbar (Patented) Drive

OPEN CYLINDER MACHINES, including:

Deckers (Single or Double End)

Multiple Stage Washers (2, 3, 4 or 5 Stage)

KNOTTERS

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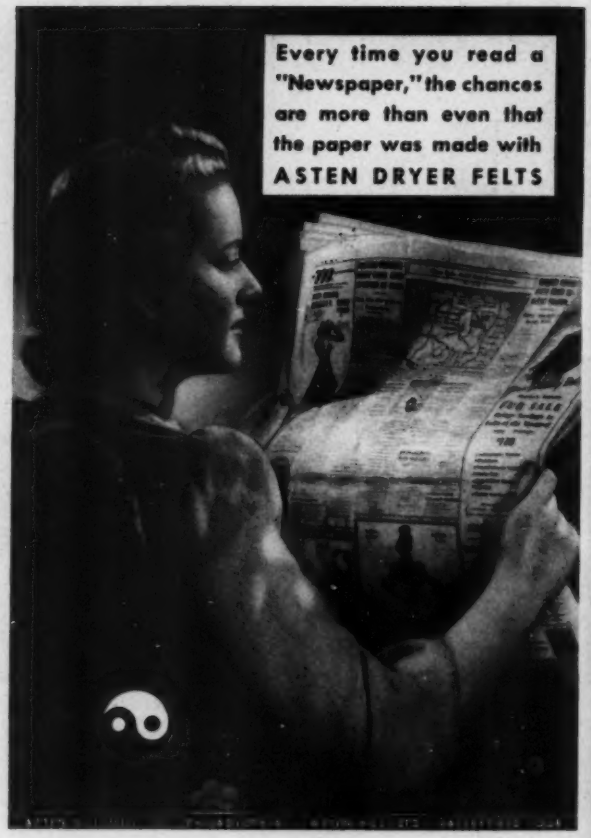

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RYERTEX *non-Metallic* **BEARINGS**

Oxyacetylene Welding and Cutting . . .

in Paper Mill Maintenance

E. H. AMBACH
The Linde Air Products Company

▶▶▶ MOST PULP AND PAPER MILLS are located a long distance from sources of supply. Welding, therefore, is almost indispensable to keep the mills in continuous operation, and to avoid lengthy shutdowns while awaiting replacement parts.

A large percentage of the maintenance problems in paper mills are a direct result of the continual wear on equipment caused by the combined corrosive and abrasive action of the materials handled. It has been observed that surfaces built up with special wear resisting, bronze welding rod resist this combined attack extremely well. As a result, bronze-welding and bronze-surfacing are extensively used in paper mill maintenance work. Innumerable parts which require the strength of steel and the corrosion resistance of bronze are made of steel and completely coated with bronze welding rod.

In the following survey, current applications of oxyacetylene welding and cutting in the pulp and paper industry are reviewed in the order of the line of production from standing timber to the finished paper.

Logging

Tractor treads, or "cats" are fabricated from angle iron. They are then hard-surfaced with an iron base hard alloy to resist impact and wear.

Chain hooks are made up by shape cutting the parts from ¾-in. or 1-in. steel plate. They are then heated by the oxyacetylene flame, forged, and twisted to their final shape (Figure 1).

Cable drums when fractured are bronze-welded; when worn, are bronze-surfaced to original dimensions.

Industrial Locomotives

Boilers, engine tenders, and piping on locomotives are regularly maintained by means of the blowpipe. Cutting operations include the removal of staybolts and rivets. Sections of boiler plate which require patching are cut out and beveled prior to welding in the patch. Old and burnt-out tubes likewise are removed by flame cutting.

Patches, new sheets, tube ends, copper and iron pipe are installed by means of the blowpipe.

Pulp and Paper Carrying Boats

A number of paper companies own fleets of boats plying between timber limits and the plants, and from the plants to ports of distribution. In the maintenance of these boats considerable welding is done regularly. Some of the more typical jobs are:

Diesel engine cylinder cracks are repaired by bronze-welding. In one case the entire cost of repairing a 12-in. crack in the water jacket of a 24-in. Diesel cylinder was less than $30 as compared to $1,000 for a replacement.

A Diesel exhaust muffler burned out. A new section, 24 in. in diameter was rolled from a 10-gauge iron, and steel-welded into place. A large saving over the cost of a new muffler was realized.

A fractured crankcase for a 12-in. auxiliary engine was repaired by bronze-welding at an approximate cost of $20.

A bilge water line of 6-in. lead pipe was completely replaced by welding. All joints were welded including elbows, tees, and lateral branches. The specials were all shop-fabricated from lead pipe and then welded into the line.

Copper steam piping for steam engines is joined by bronze-welding.

A deck winch, fractured in the end frame, was bronze-welded for about $4.50. A replacement was estimated at $50.

Valve stems eroded by steam are reclaimed quickly and at little cost by bronze-welding or by hard-facing.

Derricks for Unloading Pulpwood Boats

A hoisting drum drive gear lost seven teeth. These teeth were replaced entirely by bronze-welding with the gear in place. The welded repair effected a saving of about 80 per cent as compared with the cost of a new gear and replacement.

A hoisting engine connecting rod fractured through the shank at the big bearing end. A costly shutdown was avoided by welding with steel welding rod. This work required only about one hour.

Boom sheave flanges of cast steel, worn by the angular pull of the hoisting cable, are rebuilt with steel welding rod. This is a routine operation.

Hoisting chain shackles wear at one spot (Figure 2) due to ring friction. They can be rebuilt in fifteen minutes with steel welding rod at a fraction of the cost of new shackles. Many such shackles have been rebuilt several times.

Chain and Cable Conveyors

Drive gears, spokes, teeth, and similar parts of machinery are frequently repaired by welding. One example is a gear 8 ft. in diameter with an 8-in. face. This gear hauls 2,400 ft. of 1¼-in. cable for pulling logs along a conveyor trough. A log jam caused two teeth to strip away from the gear. These teeth were rebuilt by bronze-welding and filed to size with the gear in place. The conveyor was out of service only four hours. Replacement would have been much more expensive and would have required a shutdown of sixteen hours for dismantling and assembly.

"Kicker dogs" on chain links of pulpwood conveyors, when worn, are either rebuilt with steel welding rod, or small points of steel plate are welded onto them. A real economy results as no dismantling of the chain is necessary (Figure 3).

Conveyor trough lining plates are welded when cracked. They fracture as a result of cumulative stresses set up by the logs dropping from one conveyor level to another. Former replacement methods were costly. The welded repair not only saves replacement but proper procedure control during welding relieves the residual cumulative stresses in the plate.

Drive gears, teeth, spokes, and similar driving mechanism parts are generally bronze-welded for repair. Steel welding rod is used for repairing cast steel gears.

Cable conveyor sprockets are rebuilt with bronze. These sprockets are attached to the rim of a cast iron spider about 6 ft. in diameter. There are eight segments on the rim. A cable carrying equally spaced "buttons" runs in the groove of each segment. These grooves wear rapidly due to the combined action of water corrosion and cable friction. New segments cost about $45 each, but worn segments are bronze-surfaced for about $2.50 each. The reclaimed segments have three times the life of new segments owing to the corrosion- and friction-resisting properties of the bronze-welding rod.

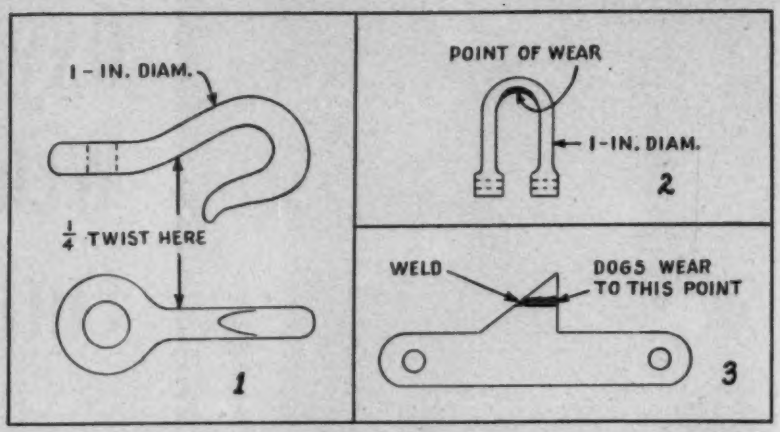

Fig. 1—Chain hooks shape-cut from steel and heated for forging by the oxyacetylene flame. . . . Fig. 2—Chain shackles are rebuilt with steel rod to original size. . . . Fig. 3—Kicker dogs are repaired with the blowpipe to eliminate replacement.

Wood Room

Barking drums, of which two types are in general use at one large plant, consist of channel bars (Figure 5) about 30 ft. long riveted to circumferential rings. Five years ago, one of the older type drums with 36 longitudinal bars sheared completely in half at the exact center. Rivets in four of the broken bars, one at each quarter point, were removed by flame cutting. One new bar was installed at each of these points and made up tight. This procedure not only lined up the drum accurately, but also enabled the operators to prepare the 32 other bars while the drum was being aligned. This drum has been in almost continuous use since its repair. New bars cost about $42 each, or a total of $1,344 for 32 of them. The welding cost was about $120. This latter figure does not include alignment costs which would have to be done in any case.

Barking drums require other maintenance operations. Worn and broken dolly castings and conveyor belt gear wheels are generally bronze-welded. New belt links are cut from plate (Figure 6). Trunnion shafts are rebuilt with bronze welding rod.

Bed plate knives in the chipper are hard-surfaced. They generally give two years of service with occasional regrinding before requiring resurfacing.

Manganese liner plates in chipper spouts are welded, as are connecting rods for shaker type chip screens. Disks for the chip crushers are rebuilt with bronze rod. Broken cast iron housings for chip crushers are repaired by bronze-welding. In one case the housing was badly fractured by disks flying off a broken shaft. The crusher was shut down for only four hours during this repair. The welded repair cost only a fraction of the cost of a new one.

Fractured plates in conveyor chutes and spouts are welded, thus eliminating removal and replacement. Steel welding rod is used for this purpose.

Apron conveyor slats are reclaimed. One type of apron conveyor is made up of steel plates (Figure 7). The slats, spaced about ¼ in. apart, are attached at each end to two flat-plate links. Thus the entire assembly resembles an endless, flat steel belt about 6 ft. wide which is carried on four sprockets. The spaces between adjacent slats permit sufficient flexing to allow the steel belt to pass around the sprockets. This conveyor carries pulpwood to slasher saws and chippers. After two years of service, considerable wear developed in the bolt holes of the slats and links, thus preventing proper "tracking" of the links on the teeth of the sprockets.

The complete conveyor was repaired in an interesting manner. A new section, consisting of eight slats, was purchased. Over a Sunday shutdown period, a corresponding section was removed from the apron and the new section installed. During the week the worn section was dismantled by cutting. Rivet hole punchings of a size slightly smaller than the worn holes were purchased at scrap prices. These punchings were then welded into the worn holes in the slats and links by steel welding. New holes were then accurately marked off and redrilled. The reclaimed section was then assembled and installed during the following Sunday shutdown. At the same time another worn section was removed. This procedure was repeated in reclaiming the entire con-

veyor thus avoiding any production loss.

This welded repair represented a tremendous saving over the cost of replacing the entire apron which would otherwise have been necessary. The sprocket teeth of the conveyor were rebuilt to original size by bronze-welding (Figure 8).

Grinder Room

Grinder shaft threads are rebuilt by bronze-surfacing. The worn section is machined off slightly undersize, and the shaft aligned in a lathe so it can be easily rotated. By means of a preheating fire in a pan in the lathe bed, the entire shaft is preheated. The area is then rebuilt by bronze-welding, the shaft cooled down slowly, and the new threads are machined.

Grinder shaft couplings are rebuilt by bronze-welding or by cast iron welding. Broken shafts are removed from flanges by means of the oxygen lance. When grinder shaft nuts become seized, the shaft is cut and split by means of the oxygen lance in order to save the nut. When bolts seize due to moisture, the nuts are split by cutting with the blowpipe and removed to save the bolts.

Oxyacetylene cutting offers a very rapid method for removing rusted bridge tree adjusting screws.

Centrifugal pump shafts are built up by bronze-welding or hard-facing. These shafts wear rapidly at the packing gland. They are rebuilt and turned or ground to size in a lathe. Shafts treated in this way outwear original shafts two to three times or more. In some plants it is now customary to surface new shafts with bronze before putting them into operation.

Agitator drive shafts operating in *lignum vitae* bearings, continually submerged in wet pulp, cannot be lubricated and wear rapidly. Bronze-surfacing gives them increased life. Twelve of these shafts have been reclaimed during the past year by one large company.

Grinder stone truing lathes are renewed by rebuilding worn parts. The slides and guides which, when worn, prevent accurate truing of the grinder stones are bronze-surfaced to restore them to original accuracy. The welding cost is only a small fraction of the replacement cost.

Pressure cylinder piston rods for grinders are rebuilt by bronze-welding. Worn grinder piston heads are similarly reclaimed at a large saving. Worn edges of grinder pockets are renewed by the use of a manganese steel bar 1¼ in. x 3 in. which is laid on the worn edge and bronze-welded to the cast iron pocket. These pockets cost about $125 apiece, while the average welding repair cost is about $25.

Pressure cylinder valve caps which become worn in the threads are bronze-surfaced. Resistance to wear and corrosion is greater than in original new caps. This saving on even such a small part is considerable due to the longer life of the bronze threads.

Bronze centrifugal pump impellers when worn are resurfaced.

Trucks with rack bodies for handling cordwood or for carrying unfinished paper, baled paper, scrap, and similar materials are fabricated and maintained by welding and cutting.

Sulphite-Acid Plant

Welded pipe coils for the sulphur melter prevent steam leakage and dilution of the sulphur. Steel welding rod is used for this welding operation.

Combustion chambers of sulphur burners are patched by means of welding. These chambers are of rolled steel construction and lined with refractory brick. In one case, a section of brick collapsed and allowed the steel shell to burn through. A large patch was rolled and welded on. This procedure avoided a lengthy shutdown. The repaired unit has been in continuous service for more than four years.

Lead piping in the acid plant requires continual maintenance. A lead welding outfit should be stationed in the sulphite department at all times for making repairs and alterations to such piping, lead tank linings, and special fittings which are shop-fabricated from lead pipe. The fittings include tees, elbows, laterals, and other types of special joints.

Impellers of sulphur gas fans are of lead cast on a bronze core. Only a small clearance is maintained between an impeller and the housing. Occasionally a slight degree of wear in the bearings permits the impeller to strike the housing and one or more vanes breaks off. Such an impeller is repaired by melting out a vee and rewelding, using cast lead "sticks" as rod. This practice effects a large saving over replacement.

It is frequently necessary to cut openings in digesters for the insertion of special fittings, or pyrometers. The cutting blowpipe method is much more

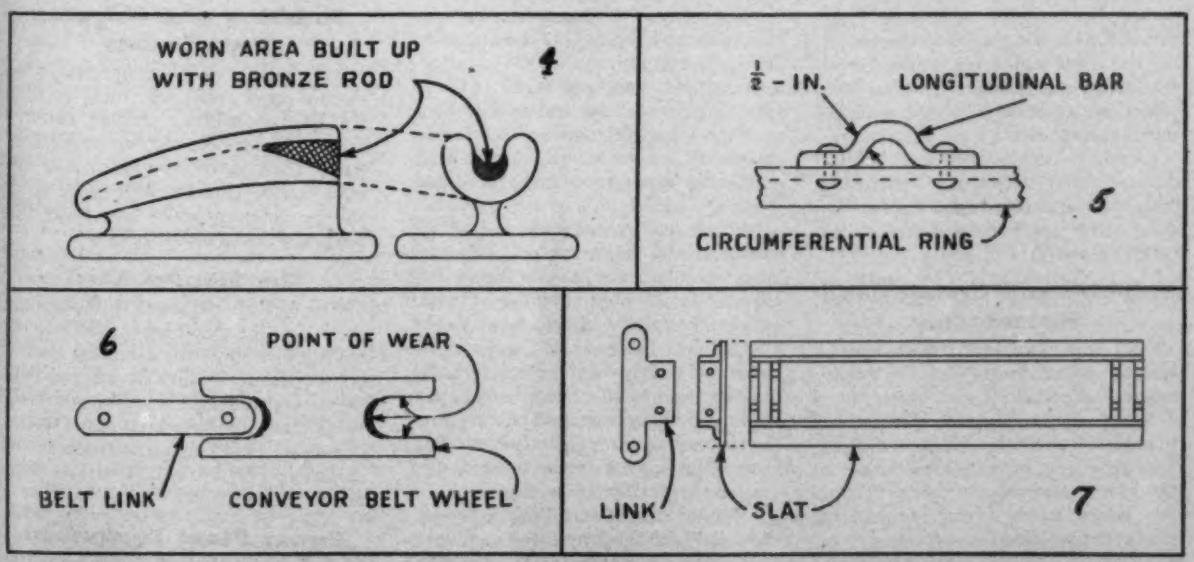

Fig. 4—Cable conveyor sprockets are bronze-surfaced at the point of wear. . . . Fig. 5—Cross section of bars on barking drums. Extensive repairs are made with the blowpipe. . . . Fig. 6—New belt links are shape-cut. . . . Belt wheels are rebuilt with bronze. . . . Fig. 7—Apron conveyor slats such as this are combined to make apron conveyor.

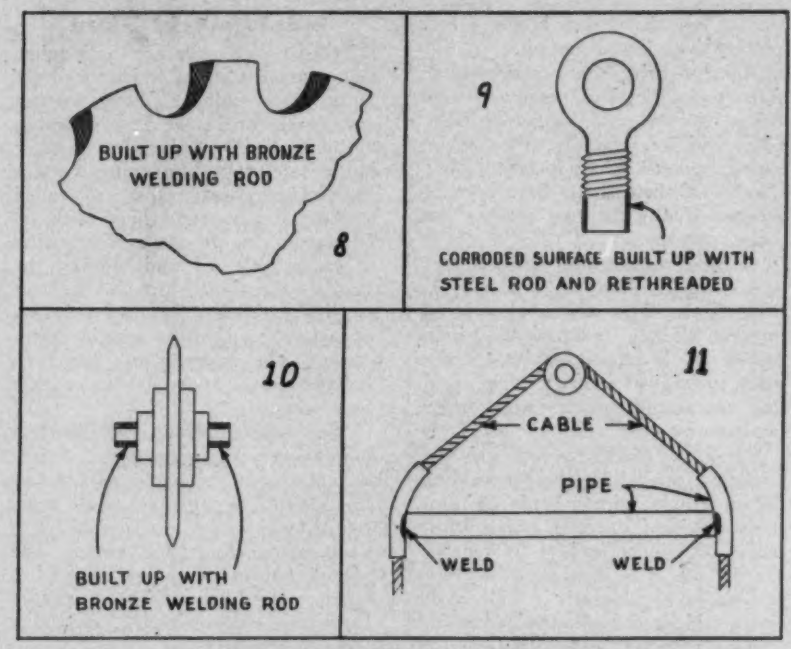

Fig. 8—Section of sprockets for apron conveyor drive shows how bronze repairs are made. . . . Fig. 9—Threads on eye bolts for digester covers are rebuilt and rethreaded when corroded. . . . Fig. 10—Journals on slitter arbors are rebuilt by bronze surfacing. . . . Fig. 11—Spreaders for paper handling slings are fabricated from pipe by welding.

rapid and less expensive than drilling through the thick shell plates.

Badly eroded bronze collars in the necks of digesters may be removed by the blowpipe. A large size tip in the welding blowpipe will melt a slot through these collars, 1¼ in. thick, in about twenty minutes. The collar is then removed with ease. Previous methods sometimes required twelve hours of drilling and chipping.

Eroded stainless steel valve stems are reclaimed at a very satisfactory saving by building them up with columbium-bearing stainless steel welding rod using a flux for stainless steel. A similar rebuilding operation takes place on worn and eroded stainless steel pump shafts.

Corroded eye bolts for holding down digester covers may be built up with steel and rethreaded. This is a satisfactory application made at low cost (Figure 9).

Sulphite and Groundwood Screenrooms

Cast iron connecting rods for flat screens, when worn, may be bronze-welded and machined to size.

Pump shafts worn at the packing gland are rebuilt by bronze-surfacing. Bronze pump impellers are renewed by bronze-surfacing. Bronze frames for rotary screen plates are repaired by bronze-welding.

Black iron and galvanized pipe used throughout the plant is welded. Special fittings such as tees, elbows, and laterals are shop-fabricated. Steel welding rod is used on the black iron pipe, and bronze welding rod on the galvanized material.

Cast iron spiders for knotter screens when fractured are bronze-welded without dismantling the screen. Thrust collars for refiners when worn are bronze-surfaced to restore proper tolerances.

Trash racks for stock canals are fabricated. The frames are of ⅜ in. x 1 in. manganese steel bar stock welded at the corners. Heavy bronze wire screen is tack-welded to the frame by using bronze rod.

Gear and chain guards of 16-gauge plate are cut to shape and then welded.

Paper shredder knives and impact hammers are built up with a hard-surfacing, non-ferrous material to prolong their life.

Couch roll journals when worn are renewed with bronze. Previously steel rod was used, but it was found that bronze lasted over three years while steel lasted only about three weeks.

Cast iron beater shafts, worn at the packing glands, are bronze-surfaced. Lighter frames on beaters, and broken lighter posts of cast iron are repaired by bronze-welding or cast-iron welding. The hood over the beater roll is repaired by cast-iron welding.

Bottom slitters of rolling paper cutters and trimmers are coated with hard-surfacing material to increase their life from one week to five months before renewal is required.

Paper Machines and Paper Mill Equipment

Welded piping systems for steam, pulp stock, and fresh or "white" water are fabricated entirely from steel pipe or copper pipe. Special fittings and headers also are of welded fabrication.

A great many parts are being rebuilt by bronze or steel welding. Among these parts are pump shafts and impellers, roll journals, parts for wire guides, drive gears, spokes, and teeth.

Other maintenance operations on paper machines and mill equipment include: the rebuilding of parts for felt conditioners, and of journals on slitter arbors; the repair of fractured brackets and sheaves on rope carriers; and the mending of fractured gears. Bronze-welding is used for most of this work.

The rebuilding of journals on slitter arbors is a type of application, frequently overlooked in connection with the reclamation of small parts (Figure 10). Even slight wear on these journals gives unsatisfactory operation. They are removed from their holders when the wear increases beyond 0.005 in. They are turned down 1/16 in., rebuilt with bronze, and machined to size. Lathe operations are facilitated because centers already have been drilled in the journals by the manufacturer. These arbors, when new, cost about $7.00. To repair them by welding costs less than $1.00, and they give longer service than new parts.

Fourdrinier wire cloth is repaired by silver soldering—a delicate operation requiring special jigs, clamps, and a special procedure. The operation, however, effects large savings.

Finishing and Shipping Departments

Maintenance welding operations on electric paper handling trucks include building up rollers. Broken castings for paper elevators are bronze-welded. Racks are constructed for sodium silicate drums. Fractured cast iron parts for the weighing scales have been economically repaired by welding.

The Storage Shed

The typical operations in the storage shed are the building-up of copper trolley wire shoes for overhead electric cranes, the rebuilding of "fingers" on motor controllers, the repair of fractured cast iron brackets for a roller conveyor, and the construction of spreaders (Figure 11) of various sizes for handling paper slings.

Power Plant Equipment

As in other industries, oxyacetylene welding is widely used in the main-

(Concluded on page 284)

COSTS *for Paper Mill Executives*

FRANK J. HICKLING, Comptroller
Minnesota and Ontario Paper Company

▸▸▸ WITH THE FIXED CEILING on sales prices and a flexible structure of costs, the margin between sales prices and costs may be narrowed to an alarming degree.

Modern day costing of manufacturing operations attempts to put into the hands of management a tool by which to gauge efficiency, and a means for following cost trends and, at the same time, it is a measure for properly costing sales.

If costs are a device by which efficiency of operation can be gauged, to whom should they be made available? What does the mill manager need to know about costs? Do the department heads, chief engineer, and chief chemist need the same information as the mill manager? Will one set of costs cover the needs of all?

These are some of the questions, which, if properly answered and acted upon, may assist management in some of the ever-increasing problems of today.

It would appear practical that there be one common set of cost reports to cover all needs. Notwithstanding differing opinions, one set of cost reports will not suffice.

One set of cost reports that will give sufficient information to the general executive, the mill executive, the plant superintendent and other departmental chiefs only leads to an endless mass of data with the real meat deeply mired in a maze of confusing figures.

Paper manufacture is a highly complicated business, even to the point of being fantastic. Its ramifications are as great as the construction of a large plant or a battleship. What engineer would attempt to build a paper mill from an artist's drawing? What naval inspector would attempt approval of a battleship without blueprints to guide him?

Why? Because the necessary details are lacking in the artist's drawing—there is no guide to follow, no gauge by which to measure results; it is only a concept.

It seems, then, that while one set of costs might serve as general, administrative, and accounting information which might be compared with the artist's drawing, another set made from the same base figures as the first set might be made for the mill executives, and could be compared with the set of blueprints.

Good mill management demands the type of mill manager who can appreciate the executive as well as the operating side of production problems, consequently he should be entitled to the same cost data as the head office executive and, in addition, he should have available the detailed cost data used at the mill for production center control.

The general superintendent, normally, is interested in all costs having to do with production and operation. While he may have no real need for all the cost data, nevertheless he may be interested in it to the degree that it may affect his judgment as to operating procedure; therefore it would seem, if he so desired, the same cost data available to the mill manager should also be made available to the general superintendent.

The chief chemist may not be interested in rewinding or sheet packing costs; however, he is interested in the cost of groundwood and sulphite pulp manufacturing but perhaps only to the degree that it takes so many units of wood to produce so many units of pulp under a given process. He may not be particularly interested in (1) the number of units of labor that it takes to make a certain number of units of sulphite or (2) that equipment repair expense is high due to increased cost of repair materials, or (3) that variable burden allocated to the sulphite manufacturing department is low due to some change made in the operations of one of the departments included in variable burden.

The master mechanic, on the other hand, may not be interested in the per cent of sulphite used in a certain grade of paper, but he is highly interested in the heavy cost of repairs to certain pieces of equipment.

The steam engineer may not be interested in the cost of operating the warehouse or loading sulphite pulp, but he is interested in the number of B.t.u.'s in the coal consumed, and he is interested in the amount of steam supplied to the electric turbines or the paper machines.

The chief engineer may be interested in the cost of repairing the plug in the jordan engine, but the decrease in stores handling charges may be only of personal interest to him.

Other department heads are interested in the cost of their own departments and care little about those of the other departments since they have no control over them and could apply no corrective measures if they desired.

Those mill executives or department heads interested only in parts of the entire operation should not be burdened with any cost data other than that which applies to the department for which they are responsible. The cost data that is made available to them should be dictated by their needs. In other words, let the needs of the department head develop the data rather than impose upon him a set of costs developed for the executive, accounting or financial departments, which are so voluminous that they lose substantially all of their operating control value due to the time of preparation.

Further, it will be observed that operating personnel deals more with physical units than with dollar values. As a consequence, it would seem that cost data for this type or class of executive should be prepared to fit his needs, majoring on statistical data and using only the values that are readily available, even though they be approximately correct, the theory back of approximating values being that it is more important for an operator to know on the third day of the month following that the clay content of a sheet was approximately 10 per cent than to wait for twenty days until the books are balanced and find the figure 9.78 per cent.

Cost data is assembled by means of a manufacturing ledger.

The manufacturing ledger is divided in such a manner as to group individual manufacturing operations into cost control centers, such as:

Wood Preparation
Wood Reclamation
Wood Chipping
Groundwood Pulp Manufacturing
Sulphite Pulp Manufacturing
Screening and Deckering
Lapping
Kraft Pulp Manufacturing
Core Tube Manufacturing
Beaters
Roll Finishing
Rewinding
Sheet Cutting
Bag Manufacturing
Packing
Warehouse and Shipping
Steam
Electric Power
Manufacturing Burden

General Burden
Inventories
Deferred Charges.

Each of the foregoing classifications may be subdivided to conform to necessity. As an illustration, it may be desirable to subdivide steam into three classifications: (a) electric boilers, (b) coal boilers, (c) purchased; or groundwood pulp manufacturing into (a) pocket grinders, (b) magazine grinders, (c) rotary grinders, (d) purchased pulp; or general burden into mill office expense, general plant insurance, plant real estate and personal property taxes, plant depreciation, building repairs.

Under the departmental subdivision of the control center, a further breakdown should be made in order to expedite an intelligent analysis of the account. As an illustration, under "Groundwood Pulp Manufacturing—Pocket Grinders," would be the following breakdown, represented by an account for each, as follows:

Pulpwood
  Spruce
Operating expenses
  Superintendence
  Labor
  Social Security and O.A.B.
  Operating Supplies and Materials
  Pulpstones
  Equipment repair—Labor and materials
  Steam
  Electric Power
Manufacturing burden
General burden
Heating.

The form of the account should be so constructed that quantities and units, as well as values, can be posted and balanced.

From the results of the manufacturing ledger, kept in the manner as described above, substantially all operating data can be developed, whether it be in units, or values, or both.

From the manufacturing ledger can be drawn off the necessary data for costing sales and, likewise, from exactly the same source, the necessary data can be gathered for the reports for the various mill executives.

A successful way of controlling costs has been to supply each department head with his portion of cost data and, very shortly thereafter, call a meeting of all the department heads, presided over by the mill manager or the mill superintendent, for discussion and/or plans of correction, if necessary. Sometimes the suggestion of a fellow department head may be helpful and, psychologically, there may be some material gain by discussing the costs of the entire plant in a group.

Starting with the beginning, the wood room superintendent would have before him a cost report for the wood room operation, this report to contain the following information:

1. Number of cords prepared
2. Cost of preparation per cord:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total materials
   (g) Electric power

   Total ————

The wood room superintendent, also being responsible for chipper room operations, would be supplied with the following data:

1. Cords chipped
2. Cost of chipping per cord:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair materials
   (f) Total materials
   (g) Electric power
   (h) Wood

   Total ————

The sulphite mill superintendent would have a report having to do with his operations, as follows:

1. Tons produced
2. Tons sulphur consumed
3. Pounds of sulphur per ton of pulp
4. Cost of sulphur per ton of sulphur
5. Tons limerock consumed
6. Pounds of limerock per ton of pulp
7. Cost of limerock per ton of limerock
8. M lb. steam consumed per ton of sulphite in manufacturing processes only
9. Pounds of pulp per cord of prepared wood
10. Average moisture of chips
11. Cost per ton of sulphite:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair materials
   (f) Total materials
   (g) Chemicals
   (h) Steam
   (i) Electric power
   (j) Wood

   Total ————

The pulp superintendent would be supplied with data having to do with lapping screened sulphite, as follows:

1. Tons lapped
2. Cost per ton lapped:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total materials
   (g) Electric power

   Total ————

The groundwood superintendent is responsible for the groundwood mill operations, as well as the screening, deckering and slush storage of groundwood pulp, and would be supplied with data, as follows:

1. Cords used—spruce
2. Cords used—poplar
3. Tons ground
4. Stone days operated
5. Tons pulp produced per stone days
6. Hp. consumed per ton ground
7. Pounds of pulp per prepared cord—spruce
8. Pounds of pulp per prepared cord—poplar
9. Cost per ton of unscreened groundwood pulp:
   (a) Operating labor
   (b) Running repair
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total material
   (g) Electric power
   (h) Pulpstones
10. Prepared wood

    Total ————

Screening, Deckering and Slush Storage

1. Cost per ton of screened groundwood pulp:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total material
   (g) Electric power

   Total ————
2. Unscreened groundwood pulp

   Total ————
3. Tons handled
4. Per cent screenings loss

Let us assume that the sulphite screening equipment, for convenience, was located in the same building as the groundwood screening equipment, and the responsibility for the screening operation is with the groundwood superintendent. He is supplied with cost data covering this operation, also, as follows:

1. Cost per ton of screened sulphite pulp
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating materials
   (e) Running repair material
   (f) Total material
   (g) Electric power

   Total ————
2. Unscreened sulphite pulp

   Total ————
3. Tons handled
4. Per cent screenings loss

Inasmuch as the lapping machines for screenings are located in the same building and adjacent to the groundwood and sulphite screenings, the groundwood superintendent has the responsibility of this operation also,

and is supplied with the following cost data:

1. Tons lapped
2. Tons shipped
3. Cost per ton lapped:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total materials
   (g) Electric power

   Total ————

The paper mill superintendent assumes the responsibility of the machine and finishing room operations and consequently is supplied with the following data:

Machine Room Operations

1. Machine days operated
2. Tons produced (unfinished)
3. Average tonnage per mill day (unfinished)
4. Machine trim efficiency
5. Machine time efficiency
6. Total furnish to machines
7. Per cent sulphite
8. Per cent groundwood
9. Pounds of steam used in drying and on steam turbines per ton of finished paper
10. Pounds of paper per inch of trim 32 lb. basis
11. Average moisture content
12. Cost per ton of finished tonnage less cores and wrappers:
    (a) Operating labor
    (b) Running repair labor
    (c) Total labor
    (d) Supplies and operating material
    (e) Running repair material
    (f) Total materials
    (g) Electric power
    (h) Clothing
    (i) Chemicals
    (j) Steam
    (k) Stock

    Total ————
13. Coal oil
14. Lubricants (machine room)

Finishing Room Operations

1. Tons finished
2. Pounds of wrapper per ton
3. Finishing cost per ton:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total material
   (g) Wrappers

   Total ————

The warehouse superintendent, having the responsibility for shipping, receives the following data:

1. Tons shipped
2. Cost of shipping per gross ton shipped:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total material

   Total ————

The steam plant engineer, responsible for all steam produced, receives the following data:

Combined Coal and Electric

1. Tons of coal delivered to boiler house and storage
2. Tons of coal consumed
3. Cost of coal f.o.b. mill
4. Kw-hr. secondary electric power consumed
5. Total pounds of water evaporated
6. M lb. steam delivered
7. M lb. steam consumed in boiler house
8. Cost of boiler house operations per M lb. water evaporated:
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating material
   (e) Running repair material
   (f) Total materials
   (g) Coal
   (h) Secondary electric power

   Total ————
9. Cost of steam per M lb. delivered.

Electric Steam Costs and Data

1. M lb. produced
2. Kw-hr. per M lb.
3. Cost of steam per M lb.
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating materials
   (e) Running repair materials
   (f) Total materials
   (g) Secondary electric power

   Total ————

Coal Steam Costs and Data

1. M lb. produced
2. Consumed by coal boilers
3. Lbs. water evaporated per lb. of coal
4. Cost of steam per M lb. produced
   (a) Operating labor
   (b) Running repair labor
   (c) Total labor
   (d) Supplies and operating materials
   (e) Running repair material
   (f) Total materials
   (g) Coal

   Total ————

The yard foreman, having the responsibility for maintenance of yard, receives data on yard expense, as follows:

1. Average number of men employed
2. Operating labor
3. Running repair labor
   Total labor ————
5. Running repair material
   Total material ————

   Total ————

The master mechanic, having the responsibility for maintenance crew, receives data as follows:

———— Tons

	Labor	Supplies	Total
1. Running repairs	——	——	——
2. Special repairs	——	——	——
3. Structure repairs	——	——	——
4. Capital extension or addition	——	——	——
5. All other maintenance crew charges	——	——	——

Lubricants per ton of paper.

In addition to the above are items of expense contributing to manufacturing burden, which include cost of operating stores department, unallocated machine shop expense, pump house expense, plant lighting, etc.

It will be noted from the foregoing data supplied to each department head that little reference is made to raw material cost manufacturing or general burden. The reason for this is that the wood room superintendent, as an illustration, has no control over the cost of rough wood coming into his department, consequently he should not be charged with any responsibility in connection therewith. He is charged with the responsibility of all costs incurred in the wood room, and until such time as the rough product becomes prepared wood.

Likewise, the sulphite mill superintendent has no control over the cost of chips, and is not charged with any responsibility in connection therewith, but is charged with the responsibility of all costs in converting the chips to pulp and, thence, through the screens.

None of the department heads are charged with responsibility in connection with manufacturing burden, even though, on the executives' cost sheets, it appears as a matter of expense, except the master mechanic in charge of the machine shop, pump house superintendent, in charge of the pump house, chief electrician, in charge of the plant lighting, etc.

None of the department heads are charged with any responsibility in connection with general burden—that is, insurance, depreciation, taxes, etc., this being the responsibility of the mill manager and/or general superintendent, or the executive department.

In conclusion, there is no doubt but that something can be accomplished toward improvement of the profit if proper cost reports are supplied to those responsible for the costs, and if some action is taken to correct discrepancies discovered by making proper comparisons of proper costs.

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▶▶▶ THE CONGRESS of the United States adopted the Stars and Stripes as the national emblem June 14, 1777. The Pledge to the Flag, now taught in many schools and repeated by the pupils daily, was first repeated at exercises in connection with the celebration of Columbus Day, October 12, 1892.

SELECTION INSTALLATION MAINTENANCE of ELECTRIC MOTORS

O. F. VEA, Motor Division
General Electric Company

▸▸▸ PRESENT-DAY CONDITIONS make it necessary that all electric motors be babied. Maintenance programs must be intensified to prevent breakdowns, because 24-hour-a-day, 7-day-a-week war production schedules cannot be interrupted; output lost today cannot be made up tomorrow. Even the failure of an inconspicuous piece of equipment can cause a considerable disruption in production.

On the other hand, industrials engaged in nonwar activities must "keep 'em turning" as long as possible because of the difficulty in obtaining new motors without the necessary priority rating.

SELECTION AND INSTALLATION

A real maintenance program begins with selection. Motors must be chosen that are properly rated and protected for their work. The selection involves a study of requirements, such as continuous or intermittent duty, starting, torque, speed regulation, and the like. These all have a bearing on just what type of motor to choose.

Tables I and II show characteristics and applications of standard a-c. and d-c. motors, respectively.

In addition, the environment in which the motor is to operate should be considered, as this determines whether an open motor or some form of enclosed motor should be used, and how the motor should be located with respect to the driven load.

The next point to be considered is installation. The motor should be located in such a way that it is accessible for inspection and repairs. Of course, it is always advisable to install the motor in a place free from adverse conditions unless it is built in a protecting enclosure. It is also important to see that the motor has ample ventilation so that heat losses will be carried away.

A standard motor should not be installed where the ambient temperature or normal temperature rise is more than 40 C. The motor should be installed on a solid foundation which is free from vibration. If it is direct-connected or belted, care should be taken to secure proper alignment, which should permit rotor end-play within reasonable limits.

All these factors must be taken into consideration if inspection and maintenance are not to be difficult.

CONNECTING THE MOTOR

All electrical connections to a motor should be made tightly enough so that the vibration of the equipment will not loosen them. Wires joined in a conduit box should be either twisted together and soldered, or bolted together. These joints should be wrapped first with rubber tape, and then with friction tape.

Wires issuing from a conduit box, especially rubber-covered extension cords, should be held in some way so that there is no strain on the connections themselves. Usually a knot in the wire inside the conduit box, or the use of conduit-box fittings that grip the wire where it leaves the box, are the most convenient ways to obtain this strain relief.

Starting the Motor

A little extra care when starting a motor for the first time is a good investment. For example, trouble may be avoided by a look at the brushes of a direct-current or single-phase repulsion motor to make sure that they are seating properly on the commutator, and with the proper pressure. It is always good practice to turn the motor over by hand before applying power to be sure it turns freely, and that no foreign materials or objects have fallen into the motor during shipment or handling.

Table I—Characteristics and Applications of Polyphase A-C. Motors

Polyphase Type	*Ratings Hp*	*Speed Regulation*	*Speed Control*	*Starting Torque*	*Pull-out Torque*	*Applications*
General-purpose squirrel cage	0.5 to 200 hp	Drops about 3% for large to 5% for small sizes	None, except multi-speed types, designed for 2 to 4 fixed speeds	200% of full-load for 2-pole to 105% for 16-pole designs	200% of full-load	Constant-speed service where starting torque is not excessive. Fans, blowers, rotary compressors, centrifugal pumps, wood-working machines, machine tools, line shafts
Full-voltage starting, high stg torque, low stg current, squirrel cage	3 to 150 hp	Drops about 3% for large to 6% for small sizes	None, except multi-speed types, designed for 2 to 4 fixed speeds	250% of full-load for high-speed to 200% for low-speed designs	200% of full-load	Constant-speed service where fairly high starting torque is required at infrequent intervals with starting current of about 400% full load. Reciprocating pumps and compressors, conveyors, crushers, pulverizers, agitators, etc.
Full-voltage starting, high stg torque, high-slip squirrel cage	0.5 to 150 hp	Drops about 7 to 12% from no load to full load	None, except multi-speed types, designed for 2 to 4 fixed speeds	300 to 315% of full load, depending upon speed and rotor resistance	300%. This motor will usually not stall until loaded to its maximum torque, which occurs at standstill	Constant-speed service and high starting torque if starting not too frequent, and for taking high-peak loads with or without flywheels. Punch presses, die stamping, shears, bulldozers, bailers, hoists, cranes, elevators, etc.
Wound-rotor, external-resistance starting	0.5 to several thousand	With rotor rings short-circuited, drops about 3% for large to 5% for small sizes	Speed can be reduced to 50% of normal by rotor resistance. Speed varies inversely as the load	Up to 300% depending upon external resistance in rotor circuit and how distributed	200% when rotor slip rings are short circuited	Where high starting torque with low-starting current or where limited speed control is required. Fans, centrifugal and plunger pumps, compressors, conveyors, hoists, cranes, ball mills, gate hoists, etc.
Synchronous	25 to several thousand	Constant	None, except special motors designed for 2 fixed speeds	40% for slow-speed to 160% for medium speed 80% pf designs. Special high-torque designs	Unity-pf motors 170%; 80% = pf motors 225%. Special designs up to 300%	For constant-speed service, direct connection to slow-speed machines and where power-factor correction is required.

Table II—Characteristics* and Applications of D-C. Motors, 1 to 300 hp.

Type	*Starting Duty*	*Maximum Momentary Running Torque*	*Speed Regulation*	*Speed Control†*	*Applications*
Shunt-wound, constant-speed	Medium starting torque. Varies with voltage supplied to armature, and is limited by starting resistor to 125 to 200 per cent full-load torque	125 to 200 per cent. Limited by commutation	8 to 12 per cent	Basic speed to 200 per cent basic speed by field control	Drives where starting requirements are not severe. Use constant-speed or adjustable-speed, depending on speed required. Centrifugal pumps, fans, blowers, conveyors, elevators, wood- and metal-working machines
Shunt-wound, adjustable-speed			10 to 20 per cent, increases with weak fields	Basic speed to 600 per cent basic speed (lower for some ratings) by field control	
Compound-wound, constant-speed	Heavy starting torque. Limited by starting resistor to 130 to 260 per cent of full-load torque	130 to 260 per cent. Limited by commutation	Standard compounding 25 per cent. Depends on amount of series winding	Basic speed to 125 per cent basic speed by field control	Drives requiring high starting torque and fairly constant speed. Pulsating loads. Shears, bending rolls, plunger pumps, conveyor crushers, etc.
Series-wound varying-speed	Very heavy starting torque. Limited to 300 per cent to 350 per cent full-load torque	300 to 350 per cent. Limited by commutation	Very high. Infinite no-load speed	From zero to maximum speed, depending on control and load	Drives where very high starting torque is required and speed can be regulated. Cranes, hoists, gates, bridges, car dumpers, etc.

* Table shows average values for standard motors.
† Minimum speed below basic speed by armature control limited by heating.

INSPECTION

When the motor has been properly selected, installed, and connected, the maintenance program really begins. To insure efficient operation and maximum production, inspection and servicing should be systematic.

Frequency of inspection and degree of thoroughness vary, and will have to be determined by the maintenance engineer. They will be governed by: (1) the importance of the motors in the production scheme (that is, if the motor fails, will the whole works be shut down?); (2) percentage of time the motor operates; (3) nature of service; (4) environment.

An inspection schedule, therefore, must be elastic and adapted to the needs of each plant. The following schedule, covering both a-c. and d-c. motors, is based on average conditions in so far as duty and dirt are concerned:

Every Week

1. Examine commutator and brushes
2. Check oil level in bearings
3. See that oilrings turn with shaft
4. See that shaft is free of oil and grease from bearings
5. Examine starter, switch, fuses, and other controls
6. Start motor and see that it is brought up to speed in normal time.

Every Six Months

1. Clean motor thoroughly, blowing out dirt from windings and wipe commuator and brushes
2. Inspect commutator clamping ring
3. Check brushes and renew any that are more than half worn
4. Examine brush holders and clean them if dirty. Make sure that brushes ride free in the holders
5. Check brush pressure
6. Check brush position
7. Drain, wash out, and renew oil in sleeve bearings
8. Check grease in ball or roller bearings
9. Check operating speed or speeds
10. See that end play of shaft is normal
11. Inspect and tighten connections on motor and control
12. Check current input and compare with normal
13. Run motor and examine drive critically for smooth running, absence of vibration, worn gears, chains, or belts
14. Check motor foot bolts, end-shield bolts, pulley, coupling, gear and journal setscrews, and keys
15. See that all motor covers, belt and gear guards are in good order, in place, and securely fastened.

Once a Year

1. Clean out and renew grease in ball or roller bearing housings
2. Test insulation by megger
3. Check air gap
4. Clean out magnetic dirt that may be hanging on poles
5. Check clearance between shaft and journal boxes of sleeve-bearing motors, to prevent operation with worn bearings
6. Clean out undercut slots in commutator
7. Examine connections of commutator and armature coils
8. Inspect armature bands

Records

The competent maintenance man will have a record card for every motor in the plant. All repair work, with its cost, and every inspection can be entered on the record. In this way, excessive amounts of attention or expense will show up and the causes can be determined and corrected.

Inspection records will also serve as a guide to tell when motors should be replaced because of the high cost to keep them in operating condition. Misapplications, poor drive engineering, and the like will also be disclosed.

LUBRICATION

One of the major features of a maintenance program, from the standpoint of effect upon the general performance of a motor, is proper lubrication.

The point has now been reached where the bearings of modern motors, whether sleeve, ball or roller, require only very infrequent attention. However, oiling and greasing of new motors is quite often entrusted to careless attendants who have been used to lubricating older designs, with housings less tight than on modern machines.

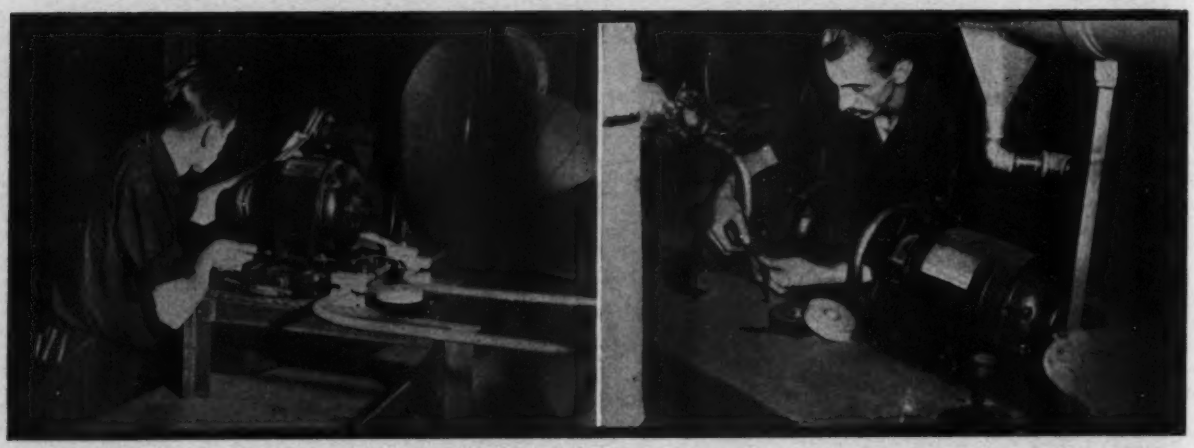
As a result, oil or grease is copiously and frequently applied to the outside as well as the inside of bearing housings. Some of the excess lubricant is carried into the machine and lodges on the windings, where it catches dirt and thereby hastens ultimate failure.

If the proper amount of a suitable lubricant is applied before starting, there should be no need to refill the housings for several months, even in dusty places.

Greasing Ball-bearing Motors

Only a high grade of grease, having the following general characteristics, should be used for ball-bearing lubrication:

1. Consistency a little stiffer than that of vaseline, maintained over the operating-temperature range.
2. Melting point preferably over 150 C.
3. Freedom from separation of oil and soap under operating and storage conditions.



LEFT—Install the motor in such a way that it is accessible for inspection and repairs. Care should be taken to align the motor properly with the driven load. RIGHT—Connections to a motor should be made tightly enough so that the vibration of the equipment will not loosen them. Wires joined in a conduit box should either be twisted together and soldered, or bolted together. These joints should be wrapped first with rubber tape, and then with friction tape.

4. Freedom from abrasive matter, acid, and alkali

In greasing a motor, care must be taken not to add too large a quantity of grease or it will cause too high an operating temperature with resulting expansion and leaking of the grease, especially with large bearings operated at slow speeds.

The following procedure is recommended for greasing ball-bearing motors equipped with a pressure-relief greasing system:

Make sure that no dirt gets into the bearing with the grease by wiping clean the pressure-gun fitting, bearing housing, and relief plug. Always remove the relief plug from the bottom of the bearing before using the grease gun. This prevents putting excessive pressure inside the bearing housing. Excessive pressure might rupture the bearing seals.

With a clean screw driver or similar tool, free the relief hole of any hardened grease, so that any excess grease will run freely from the bearing. With the motor running, add grease with hand-operated pressure gun, until it begins to flow from the relief hole. This tends to purge the housing of old grease. If it might prove dangerous to lubricate the motor while it is running, follow the procedure with the motor at a standstill.

Allow the motor to run long enough after adding grease to permit the rotating parts of the bearing to expel all excess grease from the housing. This very important step prevents overgreasing the bearing. Finally, stop the motor and replace the relief plug tightly with a wrench.

Greasing Ball-bearing Motors Not Equipped with a Pressure-relief System

A motor that is not equipped with the pressure-gun fitting and relief plug on the bearing housing cannot be greased by the procedures previously described.

Under average operating conditions, the grease with which the bearing housings of these motors were packed before leaving the factory is sufficient to last approximately one year. When the first year of service has elapsed, and once a year thereafter (or oftener if conditions warrant) the old grease should be removed and the bearings supplied with new grease.

To do this, disassemble the bearing housings and clean the inside of the housings and housing plates—or caps—and the bearings, with carbon tetrachloride. When thoroughly cleansed of old grease, reassemble all parts except the outer caps, or plates.

Apply new grease, either by hand or from a tube, over and between the balls. The amount of grease to be used varies with the type and frame size of the particular motor. The instruction sheet which accompanied the motor should be consulted for this information.

Addition of the correct amount of grease fills the bearing housings one-third to one-half full. More than the amount specified must not be used. When reassembling the motor, any V-grooves that are found in the housing lip should be refilled with grease—preferably a fibrous, high-temperature-sealing grease—which will act as an additional protective seal against the entrance of dirt or foreign particles.

The technique for greasing motors equipped with roller bearings is very similar to that used for ball bearings.

Specific instructions for the individual design should be followed, however, because more frequent greasing or slight changes in technique sometimes may be necessary.

Oiling Sleeve Bearings

The oil level in sleeve-bearing housings should be checked periodically with the motor stopped. If the motor is equipped with an oil-filler gage, the gage should be approximately three-quarters full at all times.

If the oil is dirty, drain it off by removing the drain plug, which is usually located in the bottom or side of the bearing housing. Then flush the bearing with clean oil until the outcoming oil is clean.

In fractional-horsepower motors, there may be no means of checking oil level, as all the oil may be held in the waste packing. In such cases, a good general rule for normal motor service is to add thirty to seventy drops of oil at the end of the first year and to re-oil at the end of each subsequent one-thousand hours of motor operation.

Most fractional-horsepower motors built today require lubrication about once a year. Small fan and agitator motors will often require more frequent lubrication, with three-month intervals between oilings.

Sleeve bearing housings are provided with liberal settling chambers into which dust, dirt, and oil sludge collect. The only cleaning necessary is to remove the drain plug and drain the oil, which will flush out most of the settled material with it.

Whenever the motor is disassembled for general cleaning, the bearing hous-

ing should be washed out with a solvent. Before being assembled, the bearing lining should be dried and the shaft covered with a film of oil.

CLEANING BALL BEARINGS

The pressure-relief method of greasing motors, described above, tends to purge the bearing housing of used grease. Complete cleaning of bearings, therefore, is required at infrequent intervals only. For a thorough and convenient flushing when the bearings are not disassembled, the following method is recommended:

Wipe clean the housing, pressure-gun, and relief fittings, and then remove both fittings. Every care should be taken to keep dirt out of the bearings. A bit of abrasive once in a bearing may not be removed even with the most thorough cleaning. Afterwards, it may become dislodged and get between the bearing surfaces with serious results.

With a clean screw driver or a similar tool, free the pressure-fitting hole in the top of the bearing housing of hardened grease. Also, free the relief-plug hole in the bottom of the housing from old grease to permit easy expulsion of the old grease during the cleaning process after the solvent is added.

Fill a syringe with grease solvent, such as carbon tetrachloride, and inject some of into the bearing housing through the pressure-fitting hole, while the motor is running. As the grease becomes thinned by the solvent, it will drain out through the relief hole. Continue to add solvent until it drains out quite clear.

Replace the relief plug and inject solvent until it can be seen splashing in the filling hole. Allow the solvent to churn for a few minutes, and then remove the relief plug and drain off the solvent. Repeat the churning operation until the solvent runs clean.

When using carbon tetrachloride for flushing, replace the relief plug and inject a small amount of light lubricating oil. Allow it to churn for a minute or two before draining off. This will flush out the solvent. To complete the job, grease the bearing, using the method previously described.

This method permits the cleaning of all standard motors operating at an angle not exceeding 15 degrees from the horizontal (except totally-enclosed, fan-cooled motors). For these motors, the bearing at the pulley end may be flushed as described. To clean the fan-end bearing, first remove the fan cover and fan in order to make accessible the drain plug at the bottom of the housing.

CARE OF INSULATION

Care of insulation goes hand in hand with lubrication as one of the major features of a motor maintenance program. These features concern the most vital, and probably the most vulnerable, parts of a motor.

Motors should always be stored in a dry, clean place until ready for installation. Heat should be supplied to protect against alternate freezing and thawing.

Motors that have been long in transit in a moist atmosphere, or idle for an extended period, should be thoroughly dried out before being placed in service. Since machines sometimes "sweat" as a result of a difference in their temperature and that of the surrounding air, they should be kept warm at all times to prevent this condition.

Current at a low voltage can be passed through the windings, electric heaters can be used, or even steam pipes can be utilized for protective purposes. In the case of extended idle periods, tarpaulins may be stretched over the motor and a small heater put inside to maintain the proper temperature.

Drying Out

The most effective method of drying out motors that have become wet by accident or because of "sweating" is to pass current through the windings, using a voltage low enough to be safe for the winding in its moist condition.

Thermometers should be placed on the windings to see that they are heated uniformly. Temperatures should not exceed 90 C. (Class A insulation). This method is particularly effective on high-voltage motors, where the insulation is comparatively thick.

Heat can be supplied externally by

LEFT—Keep motors free from dust and dirt by frequent wiping. This motor is arranged so that the nameplate can be read easily and quickly. RIGHT—Check oil level in sleeve bearings frequently. This is especially important today because of the scarcity of bearing material.

Wrong way of checking motor foot bolts and end shield bolts for tightness. Use wrench, not pliers, also observe safety rules.

placing heating units around the machine, covering with canvas, and leaving a vent at the top to permit moisture to escape. In doing this, it is essential that there be a circulation of warm air over all the surfaces to be dried. The air should be allowed to escape as soon as it has absorbed moisture.

Twelve-inch fans set to blow air across the fronts of "glow heaters" and then into the lower part of a motor from opposite sides will produce excellent results. The temperature of the winding should not be allowed to exceed 100 C. for Class A insulated motors. Smaller machines can be placed in ovens, the same temperature limits being observed.

Insulation Resistance Tests

The time required for complete drying-out depends considerably on the size and voltage of the motor. Insulation resistance measurements should be taken at intervals of four or five hours until a fairly constant value is reached. These tests are a good indication of the general condition of the insulation and its ability to stand the operating voltage.

The resistance should at least equal the recommended AIEE standard, which is:

$$\text{Megohms} = \frac{\text{Rated voltage of the machine}}{\frac{\text{Rating in kva}}{100} + 1000}$$

Insulation resistance tests should also be made before a high-potential test, to determine whether the insulation is ready for such a test, and afterwards to make certain that the high-potential has not injured the insulation.

High-potential Tests

High-potential tests should be made after drying out or after repairs to check the dielectric strength of the insulation.

New windings should successfully stand a high-potential test of twice normal voltage plus 1000. Motors that have been in operation for some time should be tested with this method, *after thorough cleaning and drying*, using a voltage of about 150 per cent of normal voltage, applied for one minute.

Small high-potential testing sets are available for such work and are of such capacity that very little damage will result from a breakdown during the test.

CLEANING MOTORS

A systematic and periodic cleaning of motors is necessary to insure best operation. While some machines are installed where dust, dirt, and moisture are not present, most motors are located where some sort of dirt accumulates in the windings.

Steel-mill dusts are usually highly conductive, if not abrasive, and lessen creepage distances. Other dusts are highly abrasive and actually cut the insulation in being carried through by the ventilating air. Fine cast-iron dust quickly penetrates most insulating materials.

Hence the desirability of cleaning the motors periodically. If conditions are severe, open motors might require

LEFT—Thorough cleaning of ball-bearing housings at periodic intervals is beneficial in obtaining long bearing life. Housing of this motor can be flushed without dis-assembling the motor. RIGHT—For convenience of maintenance man, many motors have ball bearings arranged to be greased with a pressure gun. Here is a standard ball-bearing open motor being greased after hardened grease has been removed. Pressure-relief greasing system facilitates adding correct amount of grease.

a certain amount of cleaning each day. For less severe conditions, weekly inspection and partial cleaning are desirable.

For the weekly cleaning, the motor should be blown out with dry, compressed air (about 25 to 30 lb. per sq. in. pressure). Where conducting and abrasive dusts are present, even lower pressure may be necessary, and suction is to be preferred, as damage can easily be caused by blowing the dust and metal chips into the insulation. On larger d-c. machines, the air ducts should be blown out so that the ventilating air can pass through as intended.

In cleaning a motor, the heavy dirt and grease should first be removed with a heavy, stiff brush, wooden or fiber scrapers, and cloths. Rifle-cleaning brushes can be used in the air ducts. Dry dust and dirt may be blown off, using dry compressed air at moderate pressure. Care must be taken to direct the air so that dust will not be pocketed in the various corners.

Grease, oil, and sticky dirt are easily removed by applying cleaning liquids like carbon tetrachloride, gasoline, or naphtha. There are several good methods of applying the cleansing liquid. Probably the best method is to spray it on. Care must be taken not to soak the insulation by dipping coils or small motors into the liquid.

While the insulation will dry quickly at ordinary room temperature after cleaning, it is highly desirable to heat it to drive off all moisture before applying varnish. If the motor can be spared from service long enough, the insulation should be dried out by heating to from 90 to 100 C.

While the motor is warm, a high-grade insulating varnish should be applied. For severe acid, alkali, or moisture conditions where oil or dusts are present, special varnishes can be supplied.

The varnish may be sprayed or brushed on. For small stators or rotors, it is best to dip the windings into the varnish, cleaning off the adjacent metal parts afterwards by using a solvent of the varnish. After applying the varnish, the best results are obtained by baking for a length of time recommended by the varnish manufacturer, which often is from 3 to 7 hours at about 100 C.

If the machine must be put back in service quickly, or if facilities are not available for baking, fairly good results will be obtained by applying one of the quick-drying black or clear varnishes which dry in a few hours at ordinary room temperatures.

GENERAL OVERHAULING

Motors should generally be given an overhauling at intervals of five years or so, normally, or, if the service is more severe, more frequently. Such a practice is beneficial in avoiding breakdowns and in extending the useful life of the equipment. Where periodic overhauling is practiced, the following notes may be helpful.

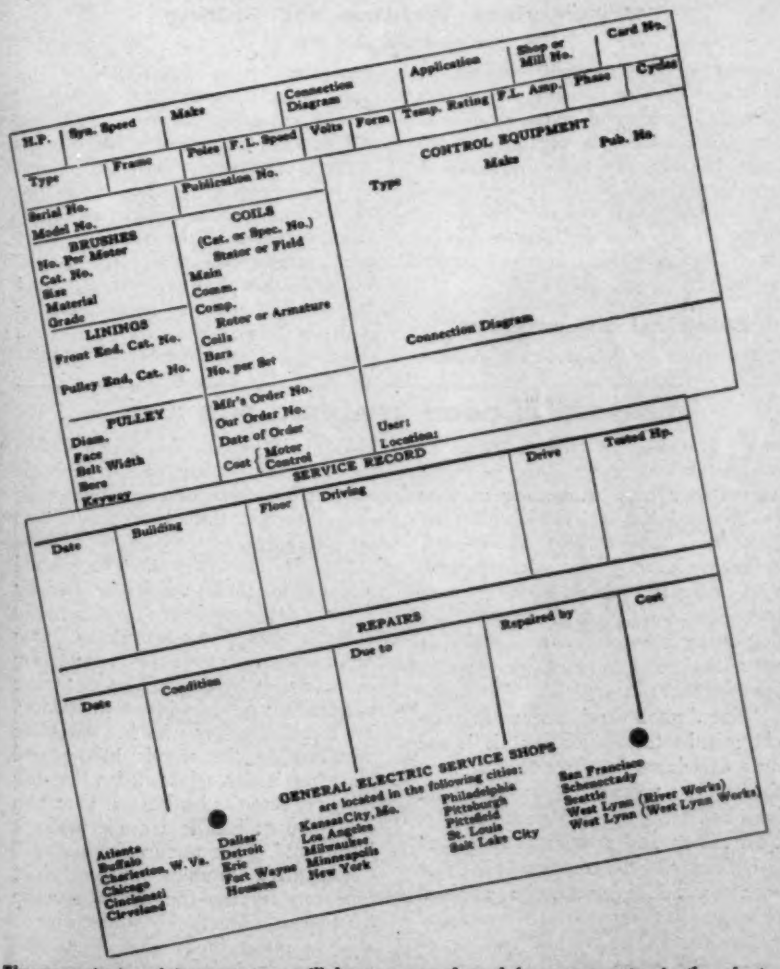
Check the motor air gap, between stator and rotor, with feelers for uniformity. Small clearance at the bottom may indicate worn bearings.

Take the motor apart and inspect it thoroughly. Measurement of the bearings and journals may indicate need for new bearing linings. Remove the waste from waste-packed bearings and rearrange or replace it, so that any glaze on the wool is removed from its point of contact with the shaft. Any gummy deposit means that the wool should be replaced. All lubricant should be cleaned out of the bearings and a fresh supply put in when the motor is reassembled.

The rotors should be cleaned with a solvent to remove any accumulated dirt, after which any rust should be removed with fine sandpaper (not emery paper). When clean and dry, the rotors should be coated with a good grade of clear varnish or lacquer to protect them from moisture. To prevent injury to the bearings, they should be completely protected with a clean rag when the motor is disassembled.

The rotors of wound-rotor motors should be given the same treatment as the stators. In addition, soldered joints and binding cords should be inspected and any weakness remedied.

The stator bore should be cleaned of dirt with a solvent, and any rust should be removed with fine sandpaper (not emery paper). Care should be taken during this operation not to damage the top sticks or end turns of the stator winding. When the stator bore has dried, any remaining dirt in the bore should be wiped out with a cloth or brushed out with a soft brush. A hand bellows or dry compressed air at low pressure may also be used.



The competent maintenance man will have a record card for every motor in the plant. Record should be made of all servicing and repairs. (Illustration shows both sides of card.)

ADDITIONAL CARE FOR D-C. MOTORS

To insure efficient operation of d-c. motors, the following inspection and servicing should be done systematically.

Brush Inspection

The first essential for satisfactory operation of brushes is free movement of the brushes in their holders. Uniform brush pressure is necessary to assure equal current distribution. Adjustment of brush holders should be set so that the face of the holder is approximately ⅛ in. up from the commutator; any distance greater than this will cause brushes to wedge, resulting in chattering and excessive sparking.

Check the brushes to make sure that they will not wear down too far before the next inspection. Keep an extra set of brushes available, so that replacement can be made when needed. Sand in new brushes, and run the motor without load as long as possible.

It is false economy to use brushes down to the absolute minimum length before replacement. Cases have been known where brushes have worn down until the metal, where the pigtail connects to the brush, was touching the commutator. This, of course, was causing severe damage to the commutator.

Make sure that each brush surface in contact with the commutator has the polished finish that indicates good contact, and that the polish covers all of this surface of the brush. Check the freedom of motion of each brush in the brush holder.

When replacing a brush, be sure to put it in the same brush holder and in its original position. It has been found helpful to scratch a mark on one side of the brush when removing it so that it will be replaced properly.

When installing new brushes, fit them carefully to the commutator. To do this, insert a strip of fine sandpaper, sand side up, between the commutator and the brush. Rotate the commutator back and forth, allowing the brushes to bear on the sandpaper only when the commutator is moving in the proper direction of rotation.

The brush should be lifted so it will not touch the sandpaper, on the back pull. Sand only until the curve of the brushes is the same as that of the commutator. Be sure that brush shunts (pigtails) are fastened securely so that current will not overheat the brushes and brush holders.

Check the springs that hold the brushes against the commutator. Improper spring pressure may lead to commutator wear and excessive sparking. Excessive heating may have annealed the springs, in which case they should be replaced and the cause of heating corrected. Larger motors have means for adjusting the spring pressure, which should be 2 to 2½ lb. per sq. in. of area of brush contact with the commutator.

Commutator

Inspect the commutator for color and condition. It should be clean, smooth, and a polished-brown color where the brushes ride on it. A bluish color indicates overheating of the commutator.

Roughness of the commutator should be removed by sandpapering or stoning. Never use emery cloth or an emery stone. For this operation, run the motor without load. If sandpaper is used, wrap it partly around a wood block.

The stone is essentially a piece of grindstone, known to the trade as a commutator stone. Press the stone or sandpaper against the commutator with moderate pressure with the motor running without load, and move it back and forth across the commutator surface.

Use care not to come in contact with live parts. If the armature is very rough it should be taken out and the commutator turned down in a lathe. When this is done, it is usually necessary to cut back the insulation between the commutator bars slightly. After turning down the commutator, the brushes should be sanded and run in as described previously. This is not necessary after light sandpapering or stoning.

Never put oil on the commutator. Proper selection of brushes gives the commutator all the lubrication required to prevent excessive wear and to build up a good smooth operating glazed surface on the copper. The addition of oil results in the development of a high resistance film which may cause undue heating and rough brush action. The oil will also have a detrimental effect on the internal parts of the commutator.

Oxyacetylene Welding and Cutting

(Continued from page 274)

tenance of power plant equipment. The fabrication of pressure piping and fittings, the repair of water vanes and wheels or runners, the repair of valves and valve seats, coal pulverizers, stoker screws, and pulverizer blower parts by hard-facing are typical. The hard-facing of top tips for pusher blocks on underfeed stokers is another routine application.

Electrical Department

Similarly, in the electrical department the repairs are essentially the same as in other industries. Repairs to fractured motor frames, end shields, and starters are frequent. The bronze-welding of commutator bars to rings, the building-up of trip latches on motor starters with a nonferrous, hard-surfacing material, the construction of sheet metal motor covers for protection from overhead moisture drip, and the welding of cast iron resistance grids for heavy duty motor starters are other typical examples.

CAMPING IS GOOD TRAINING FOR WAR

▶▶▶ The value of recreation and its relation to military training has been treated in a most interesting manner by Dr. William M. Harlow, of the New York State College of Forestry, Syracuse, New York. Dr. Harlow, who is experienced in training camp counselors, feels there can be no doubt that many present-day youngsters of pre-military and military age are soft. He further states:

"The Armed Services must fit present recruits to the job, but it is the duty of educators to see that at least those below present military age, both boys and girls, develop strong bodies, clear minds, and a courageous spirit."

Referring to the common belief that such conditioning can be attained through a program of calisthenics and group games, Dr. Harlow goes on to state: "For those just under military age who are working or may soon be working in defense industries, such a program may suffice, but in terms of long-time national defense, the middle and lower-teen-age groups must also be considered."

Dr. Harlow says that organized camping usually is wholly or partially done in the woods. Woods experience helps to develop resourcefulness. Long hikes on trails, canoe trips, and living in the woods by day and by night, are outstanding features in camp training. He says that a boy who has spent his vacations in the woods hiking and climbing is not frightened when fog blots out familiar landmarks. One who can swim or handle a canoe when it is capsized, gains resourcefulness.

Organized camping of the right type can lay the foundation for the hard-bitten, American soldier who is able to inflict blows that count and maintain an indestructible morale in the face of opposition and adversities.

Our First Job

As we see it, our first job is to put all our energy and experience into what we regard as our first essential duty — that of aiding to ensure a free world for free men. Rubber is engaged in that job. It has become a prime necessity of war. Many of the civilian products formerly used in peacetime must now be curtailed or withdrawn entirely for the duration. In reality, what appear to be inconveniences are in fact safeguards. They mean that rubber is fighting for you in the most effective way in order that all its peacetime uses may be resumed as promptly as possible.

BOSTON WOVEN HOSE AND RUBBER COMPANY

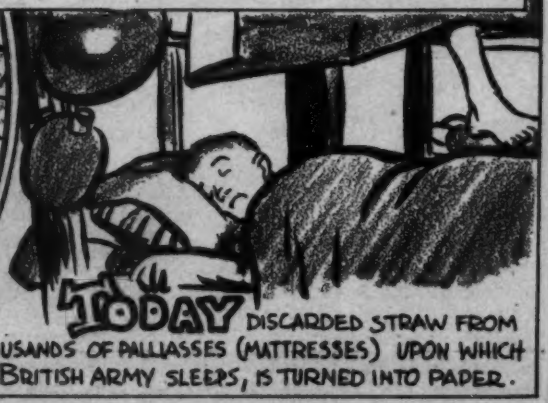
WORKS: CAMBRIDGE, MASS., U.S.A. — P.O. BOX 1071, BOSTON, MASS., U.S.A.

PAPER SKETCHES

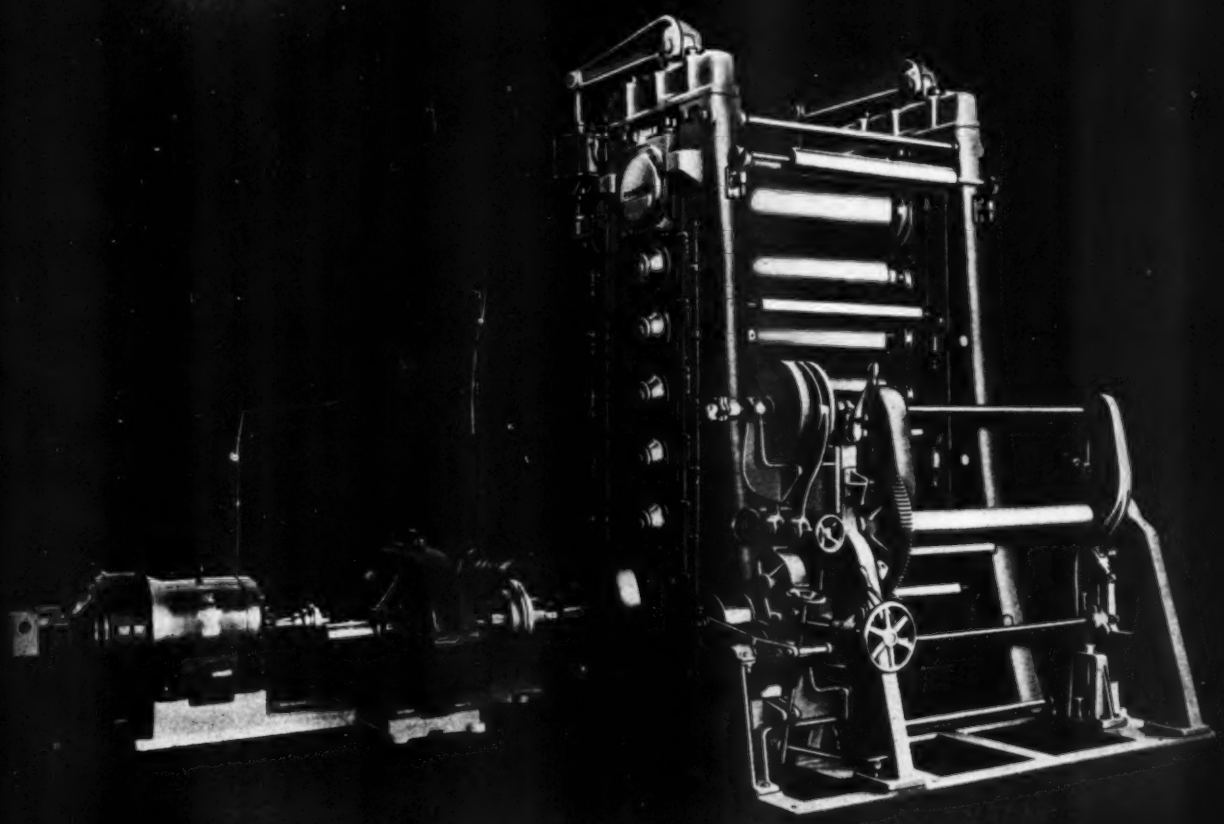
WIRES AND FELTS, USED BY CONFEDERATE PAPERMAKERS DURING THE CIVIL WAR, WERE SMUGGLED THROUGH THE LINES BY BLOCKADE RUNNERS.

THE ANCIENTS SMEARED CEDAR OIL ON VALUABLE PAPYRUS ROLLS AS PROTECTION AGAINST WORMS.

AMERICA'S FIRST PAPERMAKER—WILLIAM RITTENHOUSE—WAS BURIED IN THE CHURCHYARD OF GERMANTOWN'S MENNONITE CHURCH.



TODAY DISCARDED STRAW FROM THOUSANDS OF PALLIASSES (MATTRESSES) UPON WHICH THE BRITISH ARMY SLEEPS, IS TURNED INTO PAPER.



B. F. PERKINS & SON, INC.

ENGINEERS AND MANUFACTURERS

HOLYOKE • • • MASSACHUSETTS

ALLIED

COMPANIES AWARDED NAVY "E"

▸▸▸ The Navy "E"—traditional symbol for excellence—is being won by a large number of industrial plants doing war work. This honor is a distinct award of merit; it is not given lightly. New names are being added to this roll of honor regularly, and those so honored have just reason for pride in such an achievement.

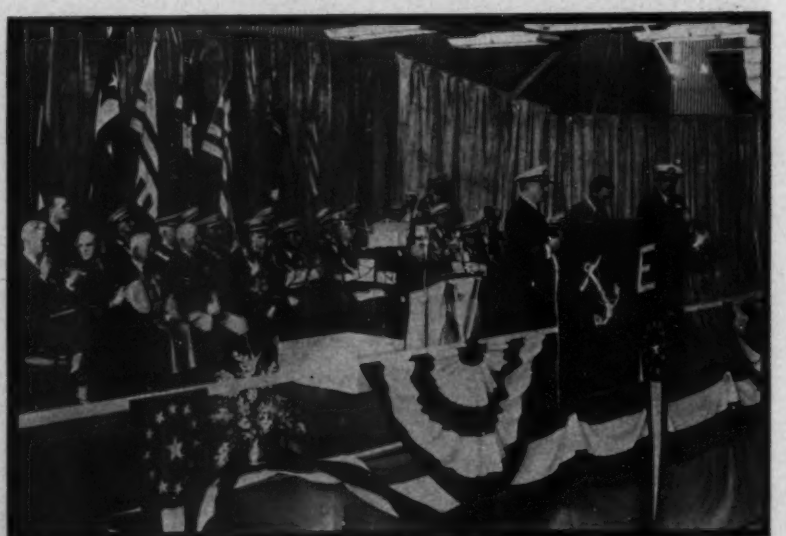
The Jeffrey Manufacturing Company, Columbus, Ohio—This company, the first company in Columbus to be so honored, received the Navy "E" Award on May 12. The presentation was accompanied by a special and most impressive program, with Lt. Gov. Paul M. Herbert as Master of Ceremonies. Governor Bricker of Ohio made the address, and the presentation was made by Captain Robert Henderson, USN (retired). A very handsome deluxe brochure was issued by the company to mark this occasion. This beautiful souvenir, in color, contained the program of presentation, copies of letters announcing the award, and copies of addresses delivered, all with illustrations. The last page carried the flag, in color, and the first stanza of the national anthem.

Farrel-Birmingham Company, Ansonia, Connecticut — The award of the symbol for "Excellence," was given to the three plants of this company, Ansonia and Derby, Connecticut, and Buffalo, New York, on May 10. Presentation was made by Rear Admiral Henry A. Wiley, USN (retired), chairman of the Navy board for production awards, and was accepted for the company by A. G. Kessler, vice president and general manager of the Buffalo plant. On behalf of all employees, William Shea, veteran employee of 62 years service, received the Navy "E" lapel emblem from Commander Robert S. Smith, Jr., USN.

American Blower Corporation, Detroit, Michigan — What this company has termed an "all-out for Victory" schedule, was climaxed May 14 with the award of the Navy "E" pennant. Rear Admiral John Downes, USN, Commandant, Ninth Naval District, made the presentation. S. L. A. Marshall, news analyst and commentator, presided at the ceremonies which were attended by the Color Guard of the Naval Training School, Detroit, and the Navy Service School Band.

Important persons in attendance at presentation ceremonies of the Navy "E" pennant to Farrel-Birmingham Company, Inc. L to R: A. G. Kessler; Captain L. F. Small; Karr Parker, Pres. of Buffalo Chamber of Commerce and chairman of the presentation ceremonies; C. Wayland Brooks, United States Senator from Illinois, principal speaker of the occasion; Commander Robert S. Smith, Jr.; Lieutenant Commander William J. Connors; Captain Frederick L. Oliver, Inspector of Naval Material, Pittsburgh district; William Shea and Rear Admiral Henry A. Wiley.

Bausch & Lomb Optical Company, Rochester, New York—The first All-Navy "E" Burgee with star awarded to an industry in the United States went to this company on May 18 in recognition of its outstanding record in Naval Ordnance production. The new pennant was adopted officially by the Navy Board for Production Awards in January. It has been described as "the highest token of commendation." The old block "E" which Bausch & Lomb won last year will be superseded by the new swallow-tail pennant carrying a fouled anchor insignia and a star in addition to the "E." The added star is given because of the fact that the company has held the "E" award for a period longer than six



Robert W. Gillispie, president of The Jeffrey Company is shown accepting the Navy "E" pennant awarded his company. At Mr. Gillispie's right is Captain Robert Henderson, USN (Ret.) who made the presentation. Holding the flag opposite Captain Henderson is his aide, Ensign Thad Brown, USN. Seated in the first row are (left to right): Governor John W. Bricker; Commander G. H. Bowman, USN (Ret.); O. R. Ehret, oldest Jeffrey employee (63 years' service); and Major General Daniel Van Voorhies, USA, commanding officer of the Fifth Corps area.

months. The new pennant is good for one year, after which the company's record will be subject to further review.

Previous Awards — Since August of last year, announcement of awards of the Navy "E" to the following companies have been published in this magazine:

Bausch & Lomb Company (first award), Rochester, N. Y.

E. I. du Pont de Nemours Company, Wilmington, Delaware.

International Nickel Company, New York City.

Sandusky Foundry & Machine Company, Sandusky, Ohio.

Heppenstall Company, Pittsburgh.

General Electric Company (Erie, Pa. plant).

South Bend Lathe Works, South Bend, Ind.

Monsanto Chemical Company, St. Louis, Mo.

Kropp Forge Company, Chicago.

Automatic Transportation Company, Chicago.

Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.

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BARRELL COMPANY ISSUES NEW BOOK —PAPER ANNUAL

Compiled by William Bond Wheelwright, of The Callaway Associates, Boston, a new book entitled *Barrell's Paper Annual*, 1942-1943, has been issued by William L. Barrell Company, Lawrence, Massachusetts. This volume contains a brief and graphic presentation of economic facts regarding the industry, a who's who in the industry associations, a brief dissertation on dryer felts, a list of books of value to those engaged in the industry, and a dictionary of paper trade terms. The frontispiece is a splendid reproduction of the home of William Rittenhouse, America's first papermaker. In all, there are 53 illustrations, 25 of them being pictures of officials of the various paper industry associations.

The volume is attractively bound in buckram, with plastic shelf back. Upon request, copies will be furnished without charge to mill officials and other executives.

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▶▶▶ JEWELED GOLD SERVICE pins were awarded by The Foxboro Company to 50 employees who completed 25 years of service at a celebration held in the main office, Foxboro, Massachusetts, on the evening of May 26. A program of entertainment made the occasion an enjoyable one, and it is assured that similar celebrations will be held annually, hereafter, to welcome new members as they qualify.

SHORT-CUT TO "ENOUGH . . . IN TIME!"

Two examples of Grinnell Pipe Prefabrication: A 20" pipe with complex turns and 20" x 32" increaser for handling hot oil in one of the new Houdry Process oil refineries . . . and an engine header involving 24"-radius U-bend.

Sub-contract your piping worries!

Here's a practical "way out" for power and process engineers who are overloaded with the added work of wartime plant extensions! A way to delegate an exacting job, yet *know* you'll get first class results!

"Give the Plans to Grinnell" as soon as your special piping requirements are roughed out. Grinnell engineers are specialists equipped by long experience to interpret power and processing layouts into superpiping systems for any industry. Grinnell plants, strategically located to serve all industries, have complete prefabrication facilities to produce underwriter-approved sub-assemblies that permit speedy erection.

Learn how such sub-contracting can ease your job of providing facilities to produce "enough . . . in time"! Write for booklet "Grinnell Piping Prefabrication". Grinnell Company, Inc., Executive Offices, Providence, R. I. Branch offices in principal cities of U. S. and Canada.

PREFABRICATED PIPING BY GRINNELL

WHENEVER PIPING IS INVOLVED

A HUNDRED YEARS *with* FIVE GENERATIONS

Above is shown the Pittsburgh Iron Store, established by Joseph T. Ryerson in 1842 on the banks of the Chicago River. At the right is an interior view of the largest of the ten Ryerson plants. This huge plant (in Chicago) covers an area equivalent to five city blocks.

▶▶▶ AN "IRON STORE" of a century ago has grown through one hundred golden years into ten plants of steel. That is not a paradoxical statement; it tells specifically, not in fable, the growth of one of the country's largest steel service organizations which this year marks its one-hundredth anniversary. Five generations of indomitable men have put the name Ryerson into steel.

In 1842, Joseph T. Ryerson, then a young man of 29, journeyed west from Pittsburgh, and on the banks of the Chicago River started his small "iron store." Even then the name "Ryerson" was well known to the iron business; as far back as 1750 members of the Ryerson family were developing ore deposits in northern New Jersey—making pig iron from ore found on property owned by a syndicate, of which George Ryerson was a member. During the Revolutionary War, Ryerson mines and forges furnished some of the iron used in the famous chain which effectively blockaded the Hudson River at West Point.

The development of the Ryerson organization throughout the past century has been accomplished through difficulties; it has survived periods of adversity such as total destruction in the Great Chicago Fire of 1871. But the words of the founder are typical of the undaunted courage and fighting spirit that went into the founding of this enterprise. In one of his last quoted statements he said that he had enjoyed fighting; "never knew what it was to be scared of fate or ever to lie down under difficulties."

And so, in 1842, the fighting blood of the Ryersons founded a business that has grown with the nation's second city. At that time Chicago was growing fast—and so was the Ryerson business.

Just two years after the founding of his business venture, Joseph T. Ryerson leased property and erected a two-story brick warehouse in what is now Chicago's loop, where he added to his stock of nuts, bolts, strap, bar, and sheet iron by installing a line of hardware. He was intent on supplying his frontier customers not only with iron, but with the tools with which to work it. By 1852—Chicago had grown in ten years from 6,000 to more than 30,000 population—another expansion came and Ryerson purchased a dock site on which is now Chicago's Wacker Drive.

Everett D. Graff, president of Joseph T. Ryerson & Son, Inc., has been associated with the company for over 35 years.

In 1855, the Bessemer furnace was introduced; thus did the business pass from iron to steel. Sixteen years later, the Ryerson business went through another "refining" when it was totally destroyed in the Chicago Fire. But immediately a new stock was ordered and business was carried on at a temporary location while a new store was being built. In 1882, a new three-story building with larger space was built north of the Chicago River on Milwaukee Avenue.

In 1883, Joseph T. Ryerson, the man who founded a business that had kept pace with a city having then half a million population, passed away and left the work he had begun in the hands of other Ryersons who are still carrying on.

The increasing tempo of the steel industry brought about the incorporation of the business in 1888 as Joseph T. Ryerson & Son, Inc., under Joseph T. Ryerson's son, Edward L. Ryerson. And a few years later the company

moved to a tract covering about 21 acres at 16th and Rockwell Streets, its present Chicago location.

In 1914, Ryerson purchased the W. G. Hagar Iron Company of St. Louis. Additional warehouse space with enlarged switching and shipping facilities were soon built. Electric traveling cranes and cutting machines were added to the equipment. This first branch plant became the forerunner of a city-by-city expansion which was to continue for 11 years—Jersey City in 1915, Detroit in 1916, Buffalo in 1919, Cincinnati in 1923, Milwaukee in 1924, Boston in 1926, Cleveland in 1927, and Philadelphia in 1929—a system of ten strategically located plants.

Just as Joseph T. Ryerson in the 1840's handled hardware to provide his customers with tools for working their iron, so today an important department of Ryerson distributes a varied line of metal working machinery.

Constant metallurgical research, both in Ryerson laboratories and in conjunction with steel mills and manufacturers, has brought about the development of the "Ryerson Certified Steel Plan": A plan for quality control which probably makes Ryerson the first in the industry to carry steel in stock accurately identified, Certified as to quality, and accompanied with a statement of physical and chemical properties. The company also has a special plan for Alloy Steels that includes the selection of entire heats of steels that meet the Ryerson specifications; the testing and heat treatment of bars from each heat; and positive identification of each bar. A chart is furnished with each shipment of alloys to give accurate chemical and physical properties, heat treatment

Edward L. Ryerson, grandson of the founder, is chairman of the board of both Joseph T. Ryerson & Son, Inc., and Inland Steel, its parent company.

response, etc., as a guide to proper heat treatment.

The company's latest announcement is the addition of the *new* NE (National Emergency) Alloy Steels to its warehouse stocks. NE Alloys are those new "lean" alloy steels established by the metallurgical staff of the War Production Board to help conserve nickel, chromium, vanadium, etc., for the duration. To make these new Alloys quickly available, Ryerson has planned a representative stock of hot rolled rounds in sizes ranging from ½ to 7 in. in diameter and in six different analyses. Heretofore, these new steels have not been available for experimentation, and it has been difficult to secure even small lots necessary for determining the suitability of the steels for an application. Now, manufacturers can get small lots for treating and testing in specific applications. This method will assure proper selection of steels, which can then be ordered confidently in production quantities.

Ryerson's chairman of the board today is Edward L. Ryerson, grandson of the founder, who is also chairman of Inland Steel Company, now its parent company. His brother, Joseph T. Ryerson, who served as president of the Ryerson Company during the first World War, continues as a director of Inland Steel. Everett D. Graff, veteran steel executive and 35 years with the Ryerson Company, is now its president. Headquarters remain in Chicago, but the organization's expansion includes plants in Jersey City, Boston, Philadelphia, Buffalo, Cincinnati, Detroit, Milwaukee, and St. Louis, with sales offices in many other cities.

History of the Ryersons prior to the century just completed relates a story of a forge which produced charcoal iron used by the American Colonies. This illustration shows remains of the early Ryerson forge located near Bloomingdale, New Jersey, built around 1750 and operated until about 1830. Pioneer forges of this type were the forerunners of today's vast steel industry. Historians number this Ryerson forge among those that helped build the famous iron chain across the Hudson River during the Revolutionary War.

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▸▸▸ COMPLETE REPAIR SERVICE for industrial rubber products and protective rubber clothing has been made available on a national basis by The Rubber Re-Nu Corporation, New York. The Re-Nu process aims to assure longer life for products in repairable condition, and in this way save thousands of pounds of rubber needed to help win the war.

◆

J-M LTD. LOANS PALMER TO CAN. P. & P. ASS'N

Frederick E. Palmer, of the Canadian Johns-Manville Company, Ltd., has been loaned by that organization to the Canadian Pulp and Paper Association and is now acting as assistant co-ordinator of the Wartime Machine Shop Board in Charge of the Montreal office.

Mr. Palmer has been connected directly and indirectly with the pulp and paper industry since 1926, having been associated with Price Brothers and Company, Quebec, Riverbend, and Kenogami; The Donnacona Paper Company, Ltd., Donnacona; and for a short period with the Fraser Companies, Ltd., Edmundston.

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▸▸▸ SINCE THE FALL OF 1940, employees of General Electric Company have been joining the armed forces at the rate of 75 a week. The company recently announced that more than 5,000 G-E employees have enlisted as follows: Army, 4,200; Navy, 500; Marine Corps, 100; and approximately 300 in the National Guard. More than 600 of the combined total were reserve officers called up for active duty.

18 NEW MEMBERS INDUCTED INTO NOPCO 15-YR. CLUB

The "NOPCO 15-Year-Club" of National Oil Products Company, Harrison, New Jersey, welcomed 18 new members on May 19. Each new member was presented with a solid gold emblem bearing the company trademark and the club's name. This group, the largest to be inducted, brings the total membership to 68.

Charles P. Gulick, president and chairman of the board, announced that the policy of giving an extra week's vacation to all new members would be continued this year, but added that those employees who felt they could help the country's war effort most by remaining at their work would receive an extra week's salary in War Bonds.

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50 YRS. PROGRESS TOLD IN BOOKLET BY MATHIESON WKS.

The Mathieson Alkali Works, Inc., New York, has published a booklet entitled "Fifty Years of Chemical Progress" in commemoration of its fiftieth anniversary this year.

This 48-page booklet very attractively presents the company's major developments since the time of its founding at Saltville, Virginia, in 1892. Such important innovations as the introduction of liquid chlorine and synthetic ammonia, the preparation of new chlorine carriers, bleaching agents, and detergents, and the production of alkalies of an exceptionally high degree of purity are included within its pages. Numerous illustrations throughout show the scope of the company's present operations and its importance in producing chemicals which are essential to America's war industry.

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THREE ADDRESSES THAT WILL REMAIN THROUGH THE YEARS

One of the finest examples of art, combining the craftsmanship of the artist, the printer, and the papermaker has been sent out by Eastwood-Nealley Corporation, Belleville, New Jersey.

On illuminated documentary paper, set in plaque relief against a background of four colors are: Lincoln's Gettysburg address (center), flanked by crucial points from the addresses of President Roosevelt after Pearl Harbor and Winston Churchill after Dunkerque.

These fine documents were printed on four different kinds of paper—domestic parchment, coated book, all sulphite, and part rag.

◆

IPI FACILITIES GIVEN OVER TO MASS. COLOR CLASS

Co-operating with the State of Massachusetts, International Printing Ink, New York, has donated the use of the Color Room of its Cambridge, Mass. office each Monday night to provide a classroom for some fifteen students of color.

All materials needed to give the students a thorough understanding of color relationship and nomenclature, such as color charts, inks, proof paper, brayers, and the like are provided for the class by International Printing Ink.

◆

WESTINGHOUSE ORDER OF MERIT AWARDED TO TWO

Since 1935, the Westinghouse Order of Merit has been awarded by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pennsylvania, to employees for outstanding contributions to the electrical and mechanical arts and to company progress. The award has been made to 200 persons, each receiving a large bronze medal which bears on its face a silver "W" and his name, with the legend "Whom his fellow men delight to honor." With the medal, a certificate with a citation is presented.

A. W. Robertson, chairman, recently conferred this honor upon G. Edward Pendray, assistant to the president in charge of publicity and advertising, and James Boyd, Eastern district manager. Mr. Pendray was cited "for his profound understanding of the mind of the public in its relation to a large industrial organization; for his sound and effctive adminstration of publicity and advertising, and for his ability to combine individual initiative with co-operation within the company."

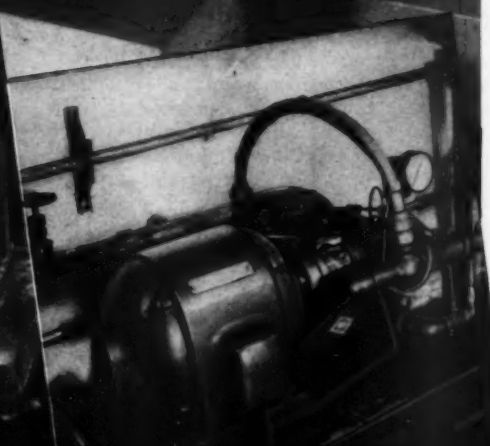
Mr. Boyd's citation was "for his clear-sighted, practical sales ability in serving a complicated metropolitan area; for his management of a sales organization under difficult conditions existing in that area; and for his personal salesmanship and courage in handling large and difficult negotiations."

PQ SILICATE AID
Increase yield by Correct use
"We've found" say paper mill operators, "that we get increased yield by precipitating PQ Silicate in the beater with alum at 4.6 pH." When more of the silicate is retained, it is measured by a higher ash content of the finished sheet (see chart below).
Thus these mills also get better quality paper. PQ Silicate helps to improve the finish and strength, also to increase rosin retention. Get more facts from PQ. Write for Bulletin #61.
PQ SILICATES OF SODA
Philadelphia Quartz Co. Manufacturers of Silicates of Soda
General Offices and Laboratory: 125 S. Third Street, Philadelphia, Pa.
Chicago Sales Office: 205 W. Wacker Drive. Stocks in 65 cities.
ASH IN PAPER
1.40
1.20
1.00
.80
.60
.40
.20
75% SULFITE
25% GROUND WOOD
SODA PULP
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
pH

MORE STAYING POWER

ON PUMPING JOBS

Protected. Dirt and dripping liquids are ever-present enemies of motor operation in locations like this. But the smoothly contoured, cast iron frame of this Tri-Clad motor guards it against damage.



Long Lasting. This Tri-Clad motor is an excellent running mate for the chlorinating pump it drives. Its extra-protection features—cast iron frame, windings of Formex wire, improved bearings—are assurance of long life on important jobs.

BUILT FOR PROTECTION FIRST . . TO LAST

The extra protection of TRI/CLAD MOTORS helps keep pumps delivering

NOW—before you buy motors—is the time to solve your pump-motor problems. Wherever continuous pumping is essential to your production—wherever pumps must operate under adverse conditions—your motors must be secure against 1) physical damage, 2) electrical breakdown, 3) operating wear and tear.

Here's where the *extra*-protection features of Tri-Clad motors will help you get the triple-shift operation you need. Their cast-iron frames and end shields exclude falling objects and dripping liquids; their windings, of Formex wire, are resistant to oil, moisture, and heat shock; their improved bearings, completely sealed in cast iron, are protected against the entry of dust and dirt. All these features add up to *extra staying power* on jobs where 24-hour production is essential.

How to Get Motors Quicker

USE STANDARD MOTORS. Wherever possible, select standard, open, sleeve-bearing motors. Building fewer "specials" means faster and greater production of motors for war work.

PLACE ORDERS EARLY. Order the motors when you order, or plan for, the equipment they are to drive.

SEND PROPER PRIORITY. Be sure correct priority papers accompany your order and that the priority rating reflects the urgency of the motor's use in the war.

CHECK G.E. for warehouse stocks. A supply of many standard motors are kept on hand to meet urgent war needs. Perhaps the motor you want, or can use with a few simple changes, is available for immediate shipment.

General Electric, Schenectady, N. Y.

General Electric and its employees are proud of the Navy award of Excellence made to its Erie Works for the manufacture of naval ordnance.

GENERAL ELECTRIC

ASSOCIATIONS

PRIORITY DIGESTS— SUPPLEMENT "A"

Since the publication of Digest of Priorities Affecting the Pulp and Paper Industry (Cf. Section Two, THE PAPER INDUSTRY AND PAPER WORLD, May, 1942), the American Paper and Pulp Association has issued the following supplementary digests:

L ORDER

(L-94) Power

This order sets up machinery to handle power shortages whenever or wherever they occur. This order gives the Director of Industry Operations authority to establish quotas for any consumer or class of consumers in case of power shortages in any given area. See our National Defense Letter No. 114 (May 7, 1942).

M ORDERS

(M-9-c) Copper Order Amended

M-9-c has been and is the most important copper order so far as the paper industry is concerned. This amendment lists hundreds of items from which copper will be eliminated after May. See our National Defense Letter No. 117 (May 12, 1942).

(M-19) Chlorine (Amended)

This amendment made little if any difference to the paper industry, nor did it change the amount the industry can use under L-11. Inventories are limited to thirty days' supply. See our National Defense Letter No. 116 (May 7, 1942).

(M-126) Iron and Steel

This order prohibits the manufacture of some 400 items, not directly connected with the war program. This order will have its effect on the paper industry since a good many of the items prohibited were wrapped or packed in paper or paperboard. This also holds true for M-9-c. However, there is some chance that paper or paper products may be used as substitutes for some of the articles that are curtailed.

(M-132) Sulphur

This order rescinds the inventory restrictions on sulphur and allows users to have on hand any quantity in order to relieve transportation tieups in the future. See our National Defense Letter No. 110 (Cf. THE PAPER INDUSTRY AND PAPER WORLD, May, 1942, page 226.

(M-144) Fuel Oil

This order clarifies the question regarding preference ratings demanded to obtain fuel oil (any liquid petroleum classified as grade No. 1, 2, 3, 4, 5, and 6, including Bunker "C" fuel oil, kerosene, range oil, gas oils, and any other liquid used for the same purpose as the above designated grades). Apparently some fuel oil distributors were demanding a preference rating before making delivery but this order does not allow them to make such demands. No preference rating is needed to obtain fuel oil according to this order.

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JOINT EMPIRE TAPPI & N. Y.-CAN. SUPTS.

On May 15 and 16, a joint meeting of the Empire State Section of TAPPI and the New York-Canadian Division of the American Pulp and Paper Mill Superintendents Association was held at Hotel Syracuse, Syracuse, New York.

Ralph A. Hayward, national TAPPI president, addressed the group on Friday evening, discussing the effect of Government regulation on the industry. Mr. Hayward said it would be impossible to accurately predict the trend which the industry would follow, and stressed the fact that his views were mere speculation. "The supply of pulp today is greater than the demand, but the supply may decrease due to lack of transportation, labor, or materials needed for the production of paper," he declared. He further stated that if such a shortage became a reality, Government curtailment was possible.

Delegates visited the paper mill laboratories of the New York State College of Forestry at Syracuse University on Saturday morning, and in the afternoon took part in a program of bridge, skeet, and golf, with War Bonds and Stamps as prizes. The meeting closed with the annual dinner-dance on Saturday night.

◆

COMMITTEES ARE NAMED FOR FALL TAPPI MEETING

Norman I. Bearse, Champion International Company, Lawrence, Massachusetts, has been appointed general chairman of the fall meeting of the Technical Association of the Pulp and Paper Industry to be held at the Statler Hotel, Boston, Massachusetts, on September 28, 29, and October 1, 1942. Vice chairmen appointed were Frederic C. Clark, Newton, Massachusetts; W. E. Brawn, Pejepscot Paper Company, Brunswick, Maine; and Helen U. Kiely (and secretary), American Writing Paper Corporation, Holyoke, Massachusetts.

Committee chairmen appointed are as follows: *Advisory*—W. E. Kenety, Fitchburg Paper Company, Fitchburg, Massachusetts; *Arrangements*—R. H. Doughty, Fitchburg Paper Company; *Entertainment*—F. W. Schneider, Hampden Color & Chemical Company, Springfield, Massachusetts; *Finance*—W. L. Foote, B. F. Perkins & Son, Inc., Holyoke, Massachusetts; *Ladies*—F. K. Becker, Bird Machine Company, South Walpole, Massachusetts; *Program*—L. B. Tucker, Crane & Company, Inc., Walton, Massachusetts; *Publicity*—H. L. Mellen, Hercules Powder Company, Wilmington, Delaware; *Registration*—H. T. Barker, Bird & Son, Inc., East Walpole, Massachusetts; *Transportation*—J. P. Kennedy, American Writing Paper Corporation.

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▶▶▶ THE ANNUAL BOWLING TROPHY of the New York Paper Industry Bowling League was won by a team representing the West Virginia Pulp & Paper Company. Both this team and the team of Bulkley Dunton Company have two legs of the championship trophy, which must be won three times to become the permanent possession of the victor. C. H. Leisler, Jr., of Mohawk Paper Mills, representing the Salesmen's Association team, held the season's high average, as well as the highest three games.

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▶▶▶ A "NATIONAL DEFENSE" program featured the final dinner meeting of the season for the Michigan Division, American Pulp and Paper Mill Superintendents Association at the Park-American Hotel in Kalamazoo May 21. Prominent on the program were address by Major Edward Chayes of the Fort Custer, Michigan, Quartermaster Corps, and special civilian defense motion pictures. Monthly dinner meetings will be resumed in the fall.

◆

▶▶▶ THE PAPER ASSOCIATION of New York has elected the following officers: Perry W. Eason, president; S. T. Baron, vice president for the fine paper division; and Eugene F. Brennan, vice president for the wrapping paper division. Directors elected were George F. Gray and Myron P.

For . . . . SEVERE RADIAL and SHOCK LOADS

Test this NORMA-HOFFMANN PRECISION ROLLER BEARING under your hardest conditions. Subject it to heavy continuous loads. Expose it to shock loads. Operate it at high speeds. You'll find it will stand up better than any other single-row bearing, of any type.

A few of the design features explaining this stand-up-ability are: short, solid, parallel roller construction giving maximum load contact area; completely machined, heavy-duty bronze retainer; extreme PRECISION in every detail.

"NORMA-HOFFMANN" PRECISION BEARINGS

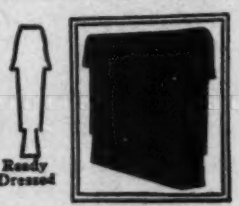
Write for the Catalog of PRECISION BALL, ROLLER AND THRUST BEARINGS. Let our engineers work with you.

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U. S. A.

"READY DRESSED" MILL COGS

LABOR SAVING—TIME SAVING

THE MOST ECONOMICAL FILLING THAT CAN BE PUT IN A MORTISE WHEEL



Ready Dressed

Blank Head

WE MAKE ANY STYLE OR SIZE WANTED

WRITE FOR INSTRUCTION SHEET "O" WHICH IS FREE

QUICK SERVICE ON ALL SIZES

THE N. P. BOWSHER CO., South Bend, Ind.

BELT LACING and FASTENERS for transmission and conveyor belts

ALLIGATOR

Trade Mark Reg. U. S. Pat. Office

STEEL BELT LACING

World famed in general service for strength and long life. A flexible steel-hinged joint, smooth on both sides. 12 sizes. Made in steel, "Monel Metal" and non-magnetic alloys. Long lengths supplied if needed. Bulletin A-60 gives complete details.

FLEXCO HD

BELT FASTENERS AND RIP PLATES

For conveyor and elevator belts of all thicknesses, makes a tight butt joint of great strength and durability. Compresses belt ends between toothed cupped plates. Templates and FLEXCO Clips speed application. 6 sizes. Made in steel, "Monel Metal", non-magnetic and abrasion resisting alloys.

By using Flexco HD Rip Plates, damaged conveyor belting can be returned to satisfactory service. The extra length gives a long grip on edges of rip or patch. Flexco Tools and Rip Plate Tool are used. For complete information ask for Bulletin F-100.

Sold by supply houses everywhere

FLEXIBLE STEEL LACING CO.

4606 Lexington St. Chicago, Ill.

PULP and PAPER MILL Screens

Precision perforations in all sizes for large production and screen durability

Copper * Steel

Monel * Stainless Steel

Chemical Resisting Alloys

The Harrington & King PERFORATING CO.

5654 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

Berman representing the fine papers, and Maurice Relkin and Fred C. Strype representing the wrapping papers.

◆

▸▸▸ A new directorate of trades training has been set up in Canada, and *Lieutenant-Colonel Howard Kennedy* has been appointed director, with the rank of colonel. Colonel Kennedy returned from England last summer to co-ordinate engineers' training in Canada. He has served as woodlands manager of the E. B. Eddy Company, Hull, Quebec; manager of Quebec Forest Industries, and as chairman of the Woodlands Section of the Canadian Pulp and Paper Association.

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LAKE STATES SEC. TAPPI HOLDS ANNUAL MEET AND ELECTION

The annual May meeting of the Lake States Section of the Technical Association of the Pulp and Paper Industry held on May 22, at the Beaumont Hotel, Green Bay, Wisconsin, was attended by more than fifty men.

Election of officers was held, resulting in the following: John Graff, of the Lawrence College Institute of Paper Chemistry, Appleton, Wisconsin, chairman; William J. Plank, Appleton, vice chairman; and Clarence J. West, Jr., Neenah, secretary.

◆

CONVENTIONS AND COMING EVENTS

June 16-18—Twenty-third Annual Meeting of the American Pulp and Paper Mill Superintendents Association, Grand Rapids, Michigan.

June 23—A. S. T. M. Water Session, Hotel Haddon Hall, Atlantic City, New Jersey.

June 29-30—Twentieth Annual Conference of the National Industrial Advertisers Association at the Hotel Traymore, Atlantic City, New Jersey.

Sept. 29-Oct. 1—Fall meeting of the Technical Association of the Pulp and Paper Industry, Hotel Statler, Boston, Massachusetts.

Oct. 5-9—The Thirty-first National Safety Congress and Exposition at the Stevens Hotel, Chicago.

Nov. 17-22—National Chemical Exposition, at the Stevens Hotel, Chicago.

Nov. 30-Dec. 5—15th National Exposition of Power & Mechanical Engineering, Grand Central Palace, New York City.

NAT. PAPERBOARD ASS'N HOLDS ITS SPRING MEETING

The spring meeting of the National Paperboard Association was held at French Lick Springs Hotel, French Lick, Indiana, May 8 and 9. Charles E. Nelson, president of the Association, presented a very timely report, emphasizing the paperboard industry's duty in connection with the war program.

Grafton Whiting of the Association staff, submitted a report on paperboard industry statistics, in which he included detailed data as to orders, days to run, production, wastepaper receipts and consumption, and pulp.

Malcolm K. Whyte, counsel, reviewed recent decisions of the Supreme Court in cases affecting taxation and labor, also referring to the functioning of the War Labor Board and decisions made by that Board.

The report for the Blanket committee (consisting of Alan G. Goldsmith, W. H. Beckwith, G. G. Otto, and N. C. Flint), was made by the secretary. He stated that the program for donating used felts and converting them into blankets, pursuant to the arrangement with The Maple Leaf Fund, has continued since October 1, 1940, and during this period a total of 105,008 blankets have been shipped.

A feature of the meeting was a discussion with regard to paperboard and paperboard products in the war program. Reference was made to various orders issued by the WPB which affect the paperboard industry, directly or indirectly, and reference was also made to the recent orders drastically reducing the use of iron and steel in the production of about 400 different items, in addition to orders restricting the production of other consumer and durable goods, and to the effect of these orders in reducing the demand for paperboard and paperboard products for the packaging and shipment of these articles. The prediction was made that within a reasonable period, the fabricators of paperboard will develop suitable paperboard packages to replace various containers made of critical materials.

The second session included a report covering the meeting of the board of directors, an interesting report on the general economic situation and the outlook for paperboard and paperboard products by Dr. Chas. F. Roos, president, The Institute of Applied Econometrics, Inc., New York City, and a talk on "Mobilization of Man Power" by Finley F. Bell.

The Task Of SUPERIOR PERFORMANCE

National survival calls for the CREAM of industrial equipment to shoulder the burden of production. Roots-Connersville Blowers and Gas Pumps give *superior performance*. Sound engineering and built-in ruggedness keep them dependable and efficient under peak-plus production requirements.

National survival comes FIRST. The cooperation of our customers is earnestly requested when their orders cannot be handled as promptly as in normal times.

Positive Displacement Blower with feeder shaft extension used on pneumatic conveying system at a large pulp and paper company. Speed 500 RPM; 3.7 lbs. normal pressure; 18 BHP.

Roots CONNERSVILLE

ALL OUT for VICTORY

ROOTS-CONNERSVILLE BLOWER CORP.

206 Monroe Avenue Connersville, Ind.

Positive Displacement and Centrifugal BLOWERS and GAS PUMPS

STANLEY
TRADE MARK

Prompt shipment to
War Production Plants

STEEL STRAPPING

★ Nailless ★
★ Nailed On ★
★ Car Banding ★

STRAPPING TOOLS

The Stanley Works
Steel Strapping Division
New Britain, Conn.

FOR 56 YEARS

BOWSER

PAPER MILL OILING SYSTEMS
Have been the Unanimous Choice
of The Paper Industry

S. F. BOWSER & COMPANY, Inc.
FORT WAYNE, INDIANA

HARDY S. FERGUSON & COMPANY
CONSULTING ENGINEERS
200 FIFTH AVENUE NEW YORK CITY

Hardy S. Ferguson—Member *A.S.C.E. A.S.M.E. E.I.C.*
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Consultation, reports, valuations, and complete designs and engineering supervision for the construction and equipment of
PULP AND PAPER MILLS AND OTHER INDUSTRIAL PLANTS
STEAM AND HYDRO-ELECTRIC POWER PLANTS
DAMS AND OTHER HYDRAULIC STRUCTURES

Quick Opening, Full Flow
Easy Operation,
Positive Shut-Off

Fig. 0851
250 lbs. steam pressure

Having a revolving ball plug, instead of the usual wedge or disc, the Fairbanks Sphero offers many advantages possessed by no other valve.

It positively eliminates frictional resistance to stream flow, as the round opening in ball plug is the same size as that in the pipe. When the ball plug is opened or closed, it wipes seating surfaces clean. Its shearing action cuts through heavy solids and liquids that would cause ordinary valves to stick and jam. There is nothing on which scale or foreign matter can accumulate.

A positive shut-off is assured as the seat rings form a perfect fit with the ball. A wedge permits adjustment to make the seat rings absolutely pressure tight. And wear on seat rings is reduced to a minimum by the rotary movement of the ball.

A quarter turn of the lever handle opens or closes the valve "as quick as a wink". And you can always be certain that it is fully open or shut tight because it has a positive stop.

When seat rings or other parts become worn, they can be replaced without removing the valve from the line.

No other valve gives such ideal service for blow-off purposes or where a full-flow, quick acting valve is required.

Write now for catalogue No. 21 and name of our nearest distributor.

THE FAIRBANKS COMPANY
Valves, Dart Unions, Hand Trucks and Wheelbarrows
387 Lafayette St., New York, N. Y.
Boston, Mass., Pittsburgh, Pa.
Distributors in Principal Cities

Fairbanks Sphero Valves

SAFETY

HEALTH-EDUCATION PORTRAYED IN NEW SERIES OF FILMS

A new series of health-education films is being introduced by Commercial Films, Inc., 1800 East 30th Street, Cleveland, Ohio. These films are said to contain no advertising of any kind; they are being produced because of an urgent call for visual programs dealing with health maintenance. The wartime emergency has brought the realization that the relation of health and well-being to labor turnover, inefficiency, lowered morale, and the inevitable accident vitally concerns industrial relations executives.

To date, one film, "Take Care of Yourself," has been issued. Among comments already received from well known companies that have used this film, a number are from safety executives.

The safety engineer of a nationally known corporation states: "We have shown the film 'Take Care of Yourself' at several of our group safety meetings. . . . The reaction has been favorable and the employees seem to like it."

Another supervisor of safety wrote: "It is exactly in line with the oral and written program which we have been carrying on for some time, but I have no doubt that the story on the screen and by sound will be much more effective."

A government engineer comments: "It has been demonstrated to a group of employees of this office as a part of their instruction in a First Aid course."

The Commercial Films, Inc., has made educational programs for such organizations as the National Safety Council over a period of years.

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IMPORTANCE OF SAFETY SUBJECT OF WPB BOOKLET

A study of safe practices in war production has been conducted by the War Production Board, and as a result a bulletin on safety training was recently issued to war contractors and Labor Division field men. This bulletin, prepared by the Training-Within-Industry Branch of the WPB Labor Division, in co-operation with the Labor Department's Labor Standards Division, is entitled "Safety on the Job for the New Employee."

Highlighting excerpts from the bulletin, the following points may well be stressed for all industrial plants:

"Information concerning the company's safety program and policies should be given at the same time as information concerning general policies. Stress the measures to guard machines and minimize physical hazards, as well as management's interest in the workers' well-being. . . .

"When the employee is being given information about his work, point out the hazards to which he will be exposed: (a) in the type of work to which he will be assigned; (b) as a result of work being performed in his immediate vicinity; and (c) as a result of operations or processes carried on in the department. The supervisor should stress the precautions which the employees must take to avoid injury, and *emphasize individual responsibility* for safety and the advantage to the employee. . . .

"In many localities, safety has suffered from a sentimental approach. Management may feel that its job is handled by the statement that 'unsafe practices will not be tolerated.' Some companies look on safety as a public relations policy (a few believe that a plant safety program ranks along with factory picnics—devices to build good will). . . .

"Safety is a production problem. Every accident, whether or not it involves human injury, is an interruption to the orderly flow of production. Manpower loss is a block to production which is almost impossible to make up. Planning instruction on the basis of the safe way and emphasizing hazards along with key points in breaking in a man on a new job are realistic foundations for a plant safety program which is undertaken on the basis of 'good business in war time,' not just because 'it's the right thing to do.'" . . .

The Paper Industry Safety Scores

July 1, 1941 to June 30, 1942

12 mills have perfect record out of 192 reporting for April

PERFECT SCORES
Division I—Pulp and Paper Mills

PARTICIPANT	MILL	LOCATION
GROUP A		
GROUP B		
St. Croix Paper Co.	Woodland	Maine
GROUP C		
American Writing Paper Corp.	Parsons Div.	Holyoke, Mass.
The Mead Corporation	Harriman Div.	Harriman, Tenn.
Marathon Paper Mills Co.	Ashland	Wisconsin
GROUP D		
U. S. Gypsum Company	Oakmont Mill	Oakmont, Pa.
U. S. Gypsum Company	North Kansas City	Missouri
Spaulding Fibre Co., Inc.	Milton	New Hampshire
*International Paper Co.	Riley No. 23	Riley, Maine
Spaulding Fibre Co., Inc.	Hayes	New Hampshire
Division II—Paper and Board Re-Manufacturing		
Thilmany Pulp & Paper Co.	Bag Mill	Kaukauna, Wis.
Bird and Son, Inc.	Roofing Plant	Shreveport, La
Bay West Paper Co.	Green Bay	Wisconsin

*April report missing—covers nine months only.

HOW OAKITE CLEANING HELPS MILLS ECONOMIZE ON MAINTENANCE!

41 ESSENTIAL JOBS DESCRIBED IN FREE 28-PAGE BOOKLET

Yours for the asking, this booklet is packed from cover to cover with ideas, methods and formulas based on successful experience of mills the Nation over that are using Oakite cleaning materials to step-up maintenance efficiency, conserve man-hours and reduce costs!

SEND FOR YOUR COPY TODAY!

Removing slime from equipment; cleaning save-alls, beaters, head boxes, holding chests, dandy rolls, cylinder wires; de-scaling vacuum pumps, evaporators, heat exchangers; souring Fourdrinier wires; washing felts on or off machine . . . all these and many other essential, commonly recurring maintenance cleaning jobs are concisely reviewed in this fact-filled booklet. On each is outlined the Oakite material and method used, the time and manual effort saved and other economies gained. Send for your FREE copy TODAY!

OAKITE PRODUCTS, INC., 16 THAMES ST., NEW YORK, N. Y.
Representatives in All Principal Cities of the U. S. and Canada

OAKITE Specialized **CLEANING**

RYERSON CERTIFIED STEELS

PROMPT SHIPMENT FROM 10 PLANTS

When you need steel of any kind, a single bar or carload, order from the nearest Ryerson plant. Write for Stock List.

Bars, Shapes	Shafting	Rivets, Bolts	Alloy Steel
Structurals	Tubing	Welding Rods	Tool Steel
Rails, Plates	Boiler Fittings	Stainless Steel	Floor Plates
Sheets—Strip	Reinforcing	Babbitt, Solder	Safety Tread

Ryertex water-lubricated Bearings give cleaner, more uniform products . . . reduced power consumption . . . longer bearing life . . . and eliminate lubrication—these are some advantages of Ryertex installations on Jordans, Beaters, Press and Couch Rolls, Grinders, Calenders, etc. Write for complete information.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

Help Beat the Axis— By Preventing Accidents!

Every delay caused by an accident in American Industry is meat and drink to Hitler, Hirohito—and Mussolini. But every accident prevented through the use of National Safety Council Service is one step nearer our final Victory.

Learn how America's progressive Paper and Pulp Mills use this Accident Prevention Service to make a blend of patriotism — humanitarianism — and plant efficiency. For full details please write to:

PAPER AND PULP SECTION

NATIONAL SAFETY COUNCIL, INC.
TWENTY NORTH WACKER DRIVE CHICAGO, ILLINOIS

NAMES *in the* NEWS

Personals

AUSTIN STORY IS NEW PRESIDENT OF CHILLICOTHE PAPER

To fill the vacancy caused by the passing of its president and founder, the late Hector McVicker (See Necrology), the board of directors of The Chillicothe Paper Company, Chillicothe, Ohio, met June 1 and elected Austin P. Story president of the company. Mr. Story, who has been vice president and treasurer, retains the office of treasurer. Mr. Edwin F. Bearce, formerly vice president and chief engineer, is now designated as vice president and production manager.

The board elected Russell McVicker to fill his late father's place as a board member.

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CHAMPION LOANS ALEX. THOMSON, JR. TO CIV. DEFENSE

Announcement was made on June 4 by Logan G. Thomson, president of The Champion Paper and Fibre Company, Hamilton, Ohio, that the company had granted a leave of absence for the duration to Alexander Thomson, Jr., vice president and advertising manager of the company.

Mr. Thomson's leave has been given so that he may act as executive vice chairman and commander of Hamilton Civilian Defense. He will be an employee of the City of Hamilton as a dollar a year man, and will serve under the orders of the City Council and R. P. Price, city manager and co-ordinator of the local defense council. He will be responsible for the organization and function of all activities relating to Civilian Defense and volunteer activities related to the war effort.

Frank Gerhart, assistant advertising manager of Champion, will take over Mr. Thomson's duties.

◆

WUNDERLICH AND BURTON PROMOTED AT M AND O CO.

The appointments of Milton S. Wunderlich as general sales manager of the Insulite division and Dr. John

Milton Wunderlich

O. Burton as chief of research for the Minnesota and Ontario Paper Company, International Falls, Minnesota, have been announced. Mr. Wunderlich succeeds the late E. W. Morrill, and Dr. Burton fills Mr. Wunderlich's previous position. Both men have served the company in various capacities. Mr. Wunderlich

Dr. John O. Burton

joined Insulite in 1932 as chief sales engineer, while Dr. Burton began his association with the company in 1938 as a research engineer.

No change in policy or personnel of the Insulite organization is contemplated, and it is planned to continue the program developed by the late Mr. Morrill.

L. C. OTTY GIVEN LEAVE TO GO WITH CANADIAN ARMY

L. C. Otty, superintendent of the Dalhousie, New Brunswick pulp mill of the International Paper Company, has obtained leave of absence for active service with the Canadian Army. He has been given the rank of acting major, and is commanding a new battery of artillery, which he recruited chiefly among employees of the company. For the past two years, he had been in command of a battery in the Canadian reserve artillery with the rank of captain.

In the first World War, Major Otty was in the Canadian artillery and served in France, Belgium, and Germany. He is a graduate in science from the University of New Brunswick and had been with the International Paper Company for about a dozen years.

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CORNELL RETIRES AFTER 13 YEARS AS SUPERINTENDENT

Merritt J. Cornell retired on June 1 from the J. P. Lewis Company, Beaver Falls, New York, after 13 years as general superintendent. He came to that company on August 1, 1929, from the Edmundson Paper Company in New Brunswick, Canada.

Mr. Cornell was born in Greenwich, New York, in 1875, and started his work in paper mills in that town with the Angel Langdon Paper Company 50 years ago last December. He is a member of the American Pulp and Paper Mill Superintendents Association.

◆

▶▶▶ President of the Bryant Paper Company, *Dr. S. Rudolph Light* has assumed the active presidency of the American National Bank of Kalamazoo, Michigan, succeeding Dunlap C. Clark, now in the United States Army as a lieutenant colonel in the services of supply.

◆

▶▶▶ Superintendent at Coshocton Straw Paper Company, Coshocton, Ohio, since January, 1939, *H. G. Funsett* has resigned to accept a position with the Curtiss-Wright Aeroplane Propeller Manufacturing Company in Indianapolis, Indiana. Mr. Funsett began his new duties just prior to May 1.

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Do you want to know How and Where to secure paper mill tanks that cost less, give better and cleaner service—and last longer? The answer is in Kalamazoo!

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▶▶▶ Five men of the Rayonier mills on the Pacific Coast have received promotions. At Grays Harbor, Washington, *W. S. Lucey* has been promoted from resident manager to general manager of the Washington mills; *Lyall Tracy* has been advanced from assistant manager to resident manager; *J. W. Bagwill*, who has been safety and personnel manager, is now assistant mill manager. At Port Angeles, Washington, *W. E. Breitenbach* has been advanced from production manager to resident manager; *A. W. Berggren*, who has been resident manager becomes assistant to the vice president of sales at the Seattle, Washington, office.

◆

▶▶▶ Well known in pulp and papermaking circles for extensive research work, *Dr. O. Maass* has been reappointed a member of the National Research Council of Canada for a period of three years, Dr. Maass is head of the department of chemistry at McGill University, Montreal.

◆

▶▶▶ *Norman W. Wilson*, president and general manager of the Hammermill Paper Company, Erie, Pennsylvania, has accepted the chairmanship of the general board of the Community and War Fund of Erie County, Pennsylvania. The organization was incorporated on May 20, with a general board of 100 leading western Pennsylvania citizens.

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▶▶▶ *J. E. Bryan* of the Wisconsin Paper & Pulp Manufacturers' Traffic Association has been named to the pulp and paper industries transportation committee of the War Production Board.

◆

▶▶▶ Early in May, *Edward J. McGuire* began his new duties as a senior business specialist with the Office of Price Administration's converted paper section in Washington. Mr. McGuire was formerly assistant sales manager in charge of sales statistics at Sutherland Paper Company, Kalamazoo, Michigan, and had been associated with the company for the past 14 years.

◆

▶▶▶ A grandson of Byron Weston, *Hale Holden, Jr.*, has been elected president of the Byron Weston Company, Dalton, Massachusetts. After graduation from Yale University in 1922, Mr. Holden became associated with the Pullman Company in the manufacturing department at Chicago as a draftsman, subsequently becoming vice president. For the past eleven years, he has been in charge of the Eastern operations of that company. Announcement was also made of the election of *Robert Crane* as vice president, and the appointment of *Harry Birt* as sales manager. Mr. Crane will continue as secretary and director also, and *John H. Bellows* will continue to hold the offices of vice president, treasurer, and director.

◆

COLUMBIA CHEMICAL DIVISION NAMES TWO NEW APPOINTMENTS

Two new appointments have been made in the Columbia Chemical Division of the Pittsburgh Plate Glass Company, Pittsburgh, Pennsylvania. R. W. Miller has been appointed manager of the technical service department and Alfonse Pechukas has been named acting director of research. They succeed, respectively, Dr. G. L. Cunningham and Dr. Irving E. Muskat, both resigned. Mr. Miller joined the company in 1930 after receiving a B. S. degree in Chemistry at Pennsylvania State College and has been engaged in technical service activities since 1937. Dr. Pechukas has been associated with the company for the past five years. He holds degrees of B. S. and Ph. D. from the University of Chicago.

R. W. Miller

◆

▶▶▶ A graduate of the University of Pittsburgh, *Fred W. Elliott* has been named a research engineer on the tetchnical staff of Battelle Memorial Institute, Columbus, Ohio, and has been assigned to the division of organic chemistry. Mr. Elliott was associated with the by-products division of the Jones & Laughlin Steel Company, Pittsburgh, prior to joining the Battelle staff. He is a member of the American Institute of Chemical Engineers.

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▶▶▶ Assistant manager of the Wayagamack Division (Three Rivers, Quebec) of the Consolidated Paper Corporation, *Fred Hogan* has been appointed manager of the company's plant at Port Alfred, Quebec. Before his departure, a group of company officials held a reception in his honor at the St. Maurice Hotel.

◆

▶▶▶ Paper mills in Kalamazoo, Michigan, are well represented on the Kalamazoo Chamber of Commerce. *Robert E. Rutledge*, president of the Sutherland Paper Company, has been elected vice president; *Allan B. Milham*, executive vice president in charge of production of the Bryant Paper Company, is a new member of the Chamber's board of directors; while *Richard J. Staebler*, president of the Kalamazoo Paper Box Company, has been re-named to the board after serving a one-year term as a special appointee.

◆

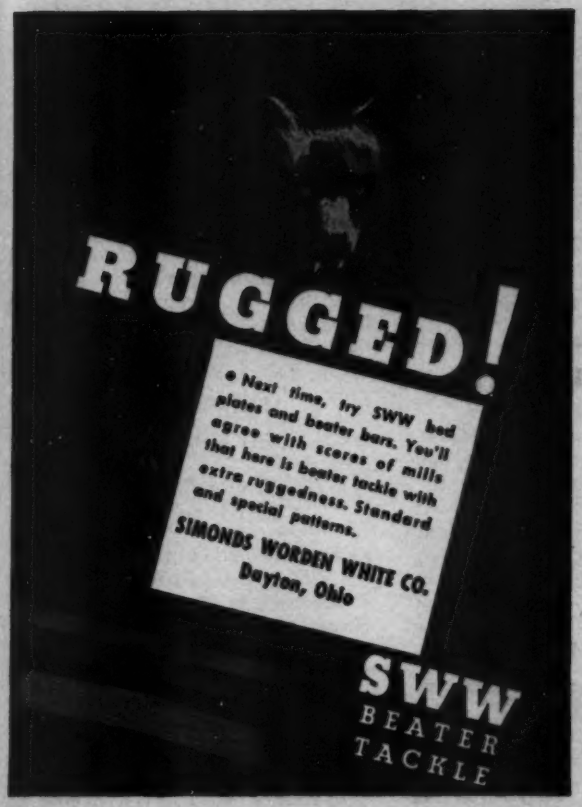
▶▶▶ The retirement of *William Watson*, 74-year-old vice president in charge of manufacturing of the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, has been announced. His duties will be assumed by *James M. White*, who has been associated with the firm continuously since 1901, and general works manager since 1941. The new manager of the general sales organization of the company is *William C. Johnson*, formerly sales manager of the crushing and cement division. He succeeds *Walter Geist*, recently elected president of the company.

◆

▶▶▶ Technical director of the Organic Research Laboratories at the National Oil Products Company plant in Harrison, New Jersey, *Dr. Donald Price* has been elected to the executive committee of the American Section of the Society of Chemical Industry.

◆

▶▶▶ The election of *A. J. Moses* as vice president of Combustion Engineering Company, Inc., New York, was announced recently. A graduate of Georgia School of Technology, Mr. Moses has been connected with the company, or its constituent companies, since 1920, holding the position of general manager of the Hedges-Walsh-Weidner Division at Chatta-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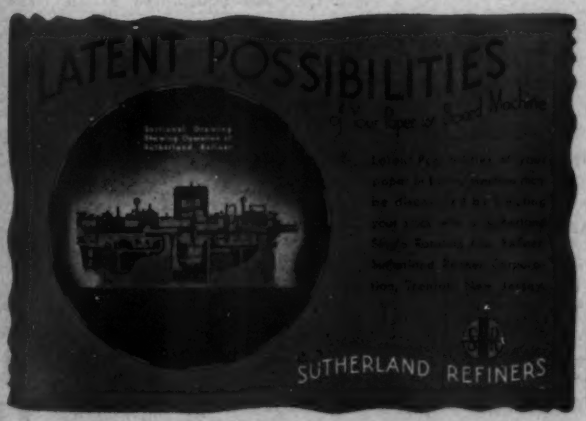

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Perhaps you as a manufacturer of papers, do not realize that alkalies and chlorine are a factor in nearly all industries—*practically every one of which is on a war time production basis.*

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Yet, as fast as changeovers can possibly be made, we are *increasing* production of important alkalies and related products to meet war time needs. At the same time, it is possible that Solvay Technical Service may prove helpful in finding a solution to problems arising from material shortages. Inquiries are cordially solicited.

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nooga, Tennessee, for the past several years. He will continue to be responsible for operations of this division, which is now engaged almost entirely in production related to the war effort.

◆

▶▶▶ Previously a member of the Iron and Steel Division of the British Purchasing Commission, *Richard N. Armstrong* has joined the Jessop Steel Company of Washington, Pennsylvania, associated with the Tool Steel Division.

◆

▶▶▶ Sales manager of the Crushing and Cement Division of the Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, *William C. Johnson* has been named manager of the company's general sales organization.

◆

▶▶▶ Manager of the Motor Division of the industrial department of General Electric Company, Schenectady, New York, *C. F. Pittman* has been named assistant to the manager of the department. *W. H. Henry*, manager of sales in the Motor Division, succeeds Mr. Pittman.

◆

▶▶▶ Announcement has been made that *Charles A. Greene* has become vice president of Paint Engineers, Inc., Hawthorne, New Jersey.

◆

▶▶▶ A graduate of Columbia University, *E. J. Barth*, petroleum technologist, has joined the research and development staff of National Oil Products Company, Harrison, New Jersey. Mr. Barth has obtained several patents in the field of chemistry.

◆

▶▶▶ An official report names *Major John Herbert Price*, of Price Brothers and Company, Quebec City, Quebec, as among thirty-five Canadian officers taken prisoners of war at Hong Kong. Major Price went to Hong Kong as second in command of the Royal Rifles of Canada.

◆

de CARTERET IS SERVING COUNTRY WITHOUT SALARY

Out of the House of Commons at Ottawa on May 13 came the report that S. L. de Carteret, Deputy Air Minister for Canada, is serving without salary or allowance from the government for Angus Macinnis, C. C. F. member for Vancouver East.

Mr. de Carteret is vice president and general manager of the Canadian International Paper Company, Montreal, and president of Continental Paper Products, Ltd., Montreal; Masonite Company of Canada, Ltd., Gatineau; and International Fibre Board, Ltd., Gatineau. He is giving full-time service to the government and a portion of his spare time thereafter is devoted to the general supervision of his former business.

Necrology

HECTOR McVICKER

Hector McVicker, president and general manager of The Chillicothe Paper Company, Chillicothe, Ohio, passed away on May 20.

At the age of 14, Mr. McVicker started to work at the paper mill of the Ingham-Mills Company, which mill was later taken over by The Mead Paper Company of Dayton. Except for one year, 1889-1890, when he worked for the Beardsley Paper Company at Elkhart, Indiana, Mr. McVicker was engaged in papermaking in his home town, Chillicothe. He was superintendent of the Scioto Division of the old Mead Paper Company, and later was general manager of the Chillicothe plant of The Mead Pulp & Paper Company. In 1919, he founded The Chillicothe Paper Company.

Hector McVicker

Mr. McVicker was 78 years old. He is survived by two daughters and a son.

◆

A. H. B. JORDAN

A. H. B. Jordan, president of the Everett Pulp and Paper Company, and Sumner Iron Works, Everett, Washington, passed away May 31.

Born in Boston, Massachusetts, Mr. Jordan attended grammar school and high school there, beginning his business career at the age of 16, when he entered a wood pulp company to serve 3 years apprenticeship. He was associated with the Champlain Fibre Company at Willsboro, New York, and after 4 years there, he resigned to take charge of the Clarion mills at Johnsburg, Pennsylvania, continuing as superintendent until 1895.

At that time, in company with William Howarth, Mr. Jordan took over the pulp mill at Lowell, the beginning of the Everett Pulp and Paper Company. Mr. Howarth became president and Mr. Jordan assumed the duties of first vice president and general manager.

Mr. Jordan was 77 years of age.

◆

▶▶▶ A retired paper broker, *John Sanford Barnes* passed away recently at his home in New York City. Mr. Barnes was treasurer of the Great Northern Paper Company, New York, at one time, and had been a member of the paper firm of Dillon & Barnes until his retirement. He was 72 years of age.

◆

BRUNO POSSANNER VON EHRENTHAL

Word has been received of the recent passing of Bruno Possanner von Ehrenthal, head of the School of Papermaking at Cöthen, Germany. He was one of the most important figures on the continent in this field of vocational education.

He was born in Vienna in 1879 and was a graduate of the University of Vienna. After wide industrial experience, he became associated with the School of Papermaking in 1909.

In a series of articles on papermaking laboratories of Europe in *The Paper Industry*, Dr. Louis E. Wise described his fine work, curriculum, remarkable collection of "watermarks" and excellent equipment in the issue of September, 1927.

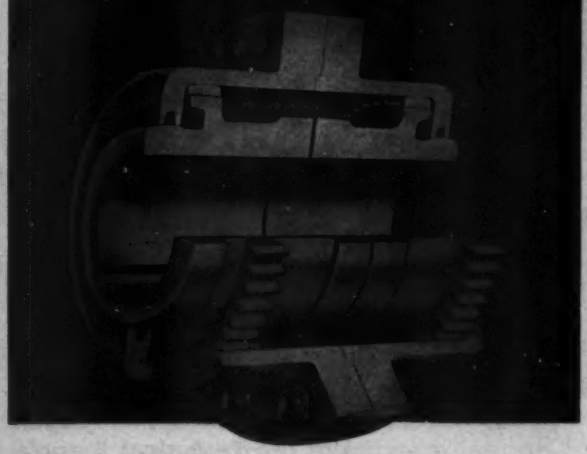
◆

JOHN NEWMAN DAVIS

At the age of sixty-eight, John Newman Davis, vice president and sales manager of J. H. Horne and Sons Company, Lawrence, Massachusetts, passed away last month. Mr. Davis had been associated with the Horne Company since 1910. Prior to that, he was with the Pusey & Jones Corporation.

Due to his long experience in the field of paper-mill machinery, Mr. Davis was widely known throughout the industry.

POOLE



A COPY OF CATALOG GIVING FULL DESCRIPTION AND ENGINEERING DATA SENT UPON REQUEST.

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Convention Papers . . . Abridged

Multiple-Specimen Neenah Expansimeter

J. A. VAN DEN AKKER,[1] CARLETON ROOT[2] and WILLMER A. WINK[3]

A simple, accurate, and highly sensitive device for measuring the hygroexpansivity of paper and other materials which exhibit change in dimensions when the moisture content is changed has recently been described (Van den Akker, J. A., "The Neenah Expansimeter," *Paper Trade J.* 109, No. 22:105-106, Nov. 30, 1939). The original Neenah expansimeter was designed to accommodate two test specimens. In view of the fact that the determination of hygroexpansivity is intrinsically slow, it was found desirable to construct an instrument which would enable one to perform measurements on many specimens simultaneously. Such an instrument, designed to accommodate twenty specimens, was constructed late in the summer of 1940. Since then this instrument has proved to be so accurate, reliable, simple, and fast in use that a brief description was believed to be of possible interest.

The main frame of the instrument is welded 1.5-inch angle iron. The frame is mounted upon a ¾ by 16 by 30¾-inch base of "Benalite." Between the frame and the base is a shallow "pan," the purpose of which will be evident later. A ¼-inch steel plate, bolted to the frame, forms the top of the instrument. The front and back and the two ends are covered with fairly heavy plate glass. The glass windows provide excellent visibility, and are so mounted that they may be easily removed or put into place. An adequate degree of airtightness is obtained by employing refrigerator door rubber gasket between the frames and the glass windows. The gasket is sealed to the frame. The previously mentioned pan serves to hold the bottom edges of the glass plates against the gasket. (In the installation of a glass plate, the bottom edge is put in place first, and then the plate is pushed toward the frame.) Threaded metal ears arranged at the top of the instrument serve to hold the top edges of the windows against the rubber gasket. Since the back and two end windows are rarely ever removed, their seals are rendered airtight by painting with a self-setting rubber compound known as "Airvulc." In order that the whole instrument may be leveled at will the base is supported on two adjusting legs and one fixed leg after the manner of mounting an analytical balance, and the top plate of the instrument carries an extremely sensitive circular spirit level (of sensitivity about 45 seconds of arc*).

Each of twenty specimens is suspended from a rod which bears up against a micrometer screw. The specimen supports, in turn, one end of a small spirit level vial (of sensitivity about 45 to 60 seconds of arc per division*). The other end of the vial is supported by a short length of 0.003-inch steel ribbon, so that a vertical motion of the lower end of a specimen causes the level vial to tilt. With the lower end of the specimen held at constant elevation by means of the level vial, change in length is measured at the top, and is read to the nearest 0.0001 inch with the micrometer.

The metal supporting members clamped at each end of a vial have weights chosen in such manner that very little force is required to lift the end of the vial supported by the specimen.

The length of specimen between the lines of clamping is nominally 10 inches, so that changes in length are simply multiplied by 10 to obtain directly the percentage change in length. For example, a change in length of 0.0562 inch is mentally multiplied by 10 to give a percentage change of 0.562 per cent. Shorter lengths can, of course, be employed. It is only necessary to furnish longer links and make a correction for the change in length.

Recirculated conditioned air may be brought into the instrument by way of a distributing pipe arranged in the bottom of the apparatus, or the chamber may be made deeper and be equipped with fans and trays containing a saturated solution of a salt chosen to control the relative humidity at the desired value. The former method is much to be preferred, since it is more effective and is neater, faster, and simpler in use.

Air from the instrument case is returned to a centrifugal air pump in order that any desired change in relative humidity will take place rapidly. Proper relative humidity is maintained by a device which contains a saturated salt solution. The device consists essentially of two metal trays: a simple tray which contains the saturated salt solution, and an inverted tray, the interior of which is equipped with seven or more partitions forming at least eight cells. (An airtight fit between these partitions and the tray wall is not necessary.) The upper tray may be simply placed in or lifted out of the lower tray at will—there is no mechanical linkage between the two trays.

Solutions which generally are called upon to extract moisture from the air should have an excess of salt, so that the crystals rise above the liquid surface.

The relative humidity in the instrument

(1) Research Associate, (2) Technical Assistant, (3) Technical Associate, The Institute of Paper Chemistry.

(*) The Gaertner Scientific Corp., 1205 Wrightwood Ave., Chicago, supplied the circular level (catalogue No. M492a) and level vials (catalogue No. M490a).

This is the fourth installment of abridgments of papers presented at the annual meeting of the **Technical Association of the Pulp and Paper Industry,** held in New York City, February 16-19, 1942. Previous installments have appeared consecutively in the March, April, and May issues, and will be continued in succeeding issues.

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is accurately measured by means of a dew-point apparatus. A portion of the main air stream is passed through this apparatus, at a point close to the outlet. The dew-point temperature and the dry-bulb temperature in the instrument enable one to obtain the relative humidity of the air as it leaves the instrument.

One should be warned that the indication of attainment of the real equilibrium of a specimen with its surroundings is apt to be deceptive. While many papers equilibrate rapidly, it is a natural characteristic of certain papers to reach equilibrium very slowly. The time required for a given sample naturally depends upon the desired accuracy, for minute changes (less than 0.01 per cent) may occur after even a day's exposure to rapidly circulated air of constant relative humidity. When the change in relative humidity is to or from a point in excess of about 75 per cent relative humidity, a considerable period of time must usually be allowed; changes from a high moisture content to a lower value require a particularly long period. In making a determination of hygroexpansivity proper account for hysteresis must be taken.

In order that the saturated salt solution will properly control the relative humidity, the equipment should be used in a constant temperature room. Constancy of temperature will also guarantee that error due to expansion and contraction of the frame will be negligible, for a variation in room temperature of 1 Fahr. will produce an apparent change in length of a test specimen of approximately 0.0007 per cent. Since the minimum change which can be read from the micrometers is 0.001 per cent, and the usually desired accuracy is 0.01 per cent, the temperature effect in a "constant temperature room" may be disregarded.

Alum Substitutes

H. E. DUSTON
Monsanto Chemical Company

The results reported in this paper are based on data obtained in the laboratory, on work done in connection with several paper mills, and on information which a number of mills have given the writer on work which they have done. The co-operation of these mills is appreciated.

The fact that alum production capacity is already heavily taxed and that it is difficult to predict what may develop in the future makes it important that the paper industry look for ways of reducing alum requirements and for suitable substitutes even though the substitutes may not be as satisfactory and economical as alum.

Let us now consider the factors that determine the amount of alum required in papermaking:

1)—On sized papers the degree of sizing desired and the amount of rosin required to obtain it govern the amount of alum necessary. The type of pulp and rosin size used affect the amount required also.

2)—The amount of color and pigment in the furnish affect the amount of alum required.

3)—The alkalinity of the water, pulp, and rosin size varies considerably and this affects the amount of alum required to neutralize this alkalinity.

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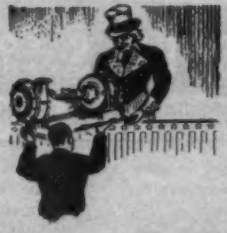
WE HAVE ENLISTED  "FOR THE DURATION"

We have placed at the disposal of the Government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

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4)—Often the amount required is governed to a large extent by that necessary to give satisfactory machine operation in regard to sticking, pitch, drainage, foam, and filler retention.

5)—The quality of fresh water and grades of paper manufactured affect the amount of alum required for coagulation, and the standards to be met on the effluent affect the amount necessary for coagulation of the white water.

As a means of fulfilling these requirements, we may consider first other possible sources of soluble alumina.

One commercial source of alumina is sodium aluminate, which is an alkaline source of alumina rather than an acid source as in the case with alum. However, the alumina from sodium aluminate is effective for sizing paper if the necessary *p*H is maintained.

Sodium aluminate is desirable to use in conjunction with alum for water coagulation where alum and an alkali are required to obtain the optimum flocing *p*H. The availability of sodium aluminate is dependent on the availability of bauxite but not on the availability of sulphuric acid.

Another possible source of alumina is aluminum chloride which, according to laboratory tests, will size paper when used with rosin in a manner similar to the use of alum. However, due to its being a chloride it does present a corrosion problem which would, no doubt, be more serious than in the case of alum. The corrosion obstacle might be overcome through the use of inhibitors. Aluminum chloride does decompose and liberate hydrochloric acid at 220-240 Fahr. This might cause serious corrosion of the dryer rolls.

If the difficulties of using aluminum chloride can be overcome there still remains the fact that it is dependent on bauxite or clay and hydrochloric acid. The latter is in part dependent on sulphuric acid although byproduct acid from chlorination is available.

A waste aluminum chloride from the process of etching aluminum with hydrochloric acid can be obtained. This aluminum chloride solution is low in impurities and should be satisfactory as to quality for the papermaking process. It is doubtful that the quantity of this material available would permit its being used as a wholesale substitute for alum.

As a second means of fulfilling alum requirements we may consider the possible substitutes for alumina. One such material, ferric oxide in the form of ferric sulphate, will bring about sizing although in comparison with alumn it has the disadvantages of dark color, lower *p*H, poorer solubility, and possibly less sizing efficiency. However, laboratory and mill results have demonstrated that on certain grades of paper ferric sulphate can be satisfactorily used in place of alum; e.g., it can be used in boxboard, fiberboard, and similar grades where the reddish brown color imparted to the paper or board is not a serious factor.

Anhydrous ferric sulphate, the commercial form, is not as readily soluble as alum. However, the results obtained in several mills indicate that if sufficient time is allowed, ferric sulphate can be added dry and will dissolve satisfactorily although dissolving first is more desirable. The time required for its solution in the beater or chest is roughly between ½ and 1½ hours depending on conditions of agitation, temperature, and *p*H.

Although laboratory tests on synthetic white water indicate that ferric sulphate might be more corrosive to the paper machine wire than alum, the laboratory corrosion tests made on actual mill white water did not show nearly as much difference between ferric sulphate and alum at the same *p*H.

Another place where ferric sulphate may be satisfactorily substituted for alum is in the coagulation of water. It has been used for this purpose for several years in municipal and industrial water and sewage plants.

An anhydrous ferric sulphate is produced commercially and it is available at the present time. In general its availability is dependent on a supply of iron oxide and sulphuric acid.

Another possible substitute for a part of the alum used in the sizing process is sulphuric acid and a number of mills at the present time have been able to appreciably reduce their alum requirements in this manner. One paper mill reports that a part of their stock is highly alkaline even after washing and a part of the alum used was necessary to neutralize this alkalinity. However, due to the limited amount of alum available this mill has been able to reduce their alum requirements by about 30 per cent. This was accomplished by the follow-

ing means: (1) Use of some acid; (2) elimination of sodium aluminate; (3) operating at a slightly higher *p*H; and (4) discontinuing the coagulation of the fresh water with alum.

Another mill making sulphite bonds reports that it has reduced the amount of alum used by 15 per cent and maintained the same *p*H by adding sulphuric acid.

Another possible means of reducing the amount of alum is to use more of the sizing agents that require no alum such as the tub sizes commonly used.

What Is Tack?

HENRY GREEN
Research Laboratories, Interchemical Corp.

An analysis of the term "tack" will be confined to its meaning as employed by the manufacturer and user of printing inks.

In view of the uncorrelated nature of the facts presented so far it would seem wisest in seeking information to go directly to the original source where the concept of tack first became associated with inks. This means questioning the so-called practical man—the man who manufactures or uses inks. Unfortunately, the practical man's conception of tack is essentially instinctive; he cannot analyze his ideas in regard to it in a manner that is of much real assistance to the scientific investigator. He can and does make it emphatic, however, that as far as he is concerned tack and the finger tapout test are one and the same thing. Therefore if it is desired to define tack and to discover what it ultimately depends upon from the ink manufacturer's and consumers' point of view it is necessary to take the inkman's simple test for tack (which in his mind is synonymous with tack) and make a logical and scientific analysis of it.

The simple test used by all inkmen is the finger test, sometimes called the patout and sometimes the tapout test. Just when it was first introduced into the ink and printing industries is quite impossible to say.

The present form of the finger test is too well known to users of printing inks to necessitate a detailed description here. The ink is rubbed out with the finger on paper or on a nonporous plate until a suitable film thickness is attained. The fingertip is pressed into this film and then drawn away suddenly. The magnitude of the pulling resistance as felt with the fingertip gives a mental impression of the degree of tackiness. An inkman's definition of tack, then, at once becomes possible. Tack is pull resistance. There is nothing particularly original about this definition. It has been approached or at least hinted at in devious ways many times in the literature. The only claim that can be made for it is that, if accepted, it automatically eliminates all other types of definitions.

Tack has been shown to be equivalent to pull resistance. Both adhesion and cohesion have so far been ruled out as the direct cause of this resistance. This leaves surface tension (which experiments have proven to be negligible in the case of printing inks and will not be discussed here)

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yield value, and viscosity to explain the phenomenon. Just how these factors line up in relative importance can be determined only by careful laboratory work. Such work requires an instrument constructed in such a manner that pull resistance can be properly analyzed. This means that each of the three factors involved—rate of pull, area of the pulling surface, and initial film thickness—must be varied one at a time, keeping the other two constant. Such an instrument has been made and studied at the Research Laboratories of Interchemical Corporation. It has been called a tackmeter and is described in detail in the analytical edition of the *Journal of Industrial & Engineering Chemistry* (Sept. 15, 1941). In brief, it consists of a metallic finger operated by a lever which in turn is actuated by a series of suspended weights. The rate of pull is varied by changing the weights; the area of the fingertip is varied by using a series of such fingertips, and the film thickness, by a micrometer screw arrangement. Measurements are made with a stopwatch in which the time required for the finger to neck down the ink to the point of rupture is noted. The reciprocal of this time is called the "rate of break." The suspended weight causing the rate of break is obviously the corresponding pull resistance.

For true liquids, pull resistance is directly proportional to the rate of break, if the pulling area and the initial film thickness are maintained constant. For plastics, the pull resistance in excess of the yield value is directly proportional to the rate of pull, with area and film thickness again remaining constant.

In brief, what the practical inkman attempts to do when he makes a tapout test is to judge the pull resistance that is offered by the ink by means of its viscosity and yield value and as modified by the area of his fingertip, the thickness of the film, and by the rate at which he pulls his finger upward. It is evident that any slight variation in the area of the fingertip will substantially alter his judgment for a fourth power is involved.

Tack depends not only on the ink but on the area of the printing surface, film thickness, and on the speed of the press. It would be much more desirable if tack depended only on the ink, and was more or less independent of the manner in which the ink is used. Fortunately this situation can be met—from the ink users' point of view at least—by putting tack on a relative basis. For instance if a stable substance, such as a mineral oil, is used as a standard of tackiness then it can be shown how many times tackier the ink is than the standard under similar conditions.

The ink manufacturer needs to know simply the viscosities of his inks in order to ascertain whether they are in the correct order of tackiness or not. A rotational viscometer can be employed conveniently for measuring relative tack provided the materials subsequently are to be applied at high speeds. If such materials are thixotropic, then only a correctly built high-speed rotational viscometer should be used. Such viscometers are not at the moment on the market but they have been designed and soon will be available.

The Use of Aldehydes in the Analysis of Sulphate Liquors for Total Alkali

D. ROMUND MOLTZAU
Research Assistant
The Institute of Paper Chemistry

When mixtures of sodium sulphide and sodium sulphite are titrated acidimetrically employing conductometric methods of end point detection, no controversion of results occurs as when potentiometric or colorimetric (indicator) methods are employed. The final end point conductometrically determined represents quantitatively the complete neutralization of the sulphide and conversion of the sulphite to bisulphite either in the presence or absence of aldehydes. Sodium thiosulphate, however, in the presence of formaldehyde, titrates conductometrically with acid to give an end point representing approximately one equivalent per mole of thiosulphate. The form of the conductometric titration graphs preceding the final acid line are in general fundamentally affected by the presence of aldehydes, especially by formaldehyde. Applied to sulphate black liquor without addition of aldehydes, the conductometric method appears to yield a valid and reliable result for total alkali representing all of the hydroxide, carbonate, sulphide and sodium organic compounds, one-half of the sodium

sulphite, but none of the sodium thiosulphate.

Approximately molar solutions (2 M in the case of sodium hydroxide) of each of the compounds involved in the investigation were made up with recently boiled distilled water from preparations of the highest purity commercially available. These were reserved as stock solutions and used throughout the work. The exact compositions or effective strengths of the solutions as determined by the acidimetric titrations involved in the investigation were checked in the case of the sulphide, sulphite, and thiosulphate solutions by iodometric methods.

In the case of the general procedure followed in the potentiometric titrations, an accurately measured volume (usually 5 cc.) of the stock solution of each constituent involved in the experiment was removed directly to the titration vessel containing such a volume of water that the total volume at the outset of the titration was approximately 100 cc. In those experiments where aldehyde was present, 5 cc. of the pure liquid acetaldehyde or furfural or of the 40 per cent formaldehyde solution were employed. This amount represented a large excess over that actually required for effective action. The solutions thus prepared were titrated potentiometrically, using a glass electrode, with standard 0.5 N hydrochloric acid. After each addition of acid the solution was briefly stirred by hand with a glass rod before the *p*H reading was made. In some of the titrations a few drops of methyl orange indicator solution were added in order to correlate the color change of that indicator in the system under investigation with the potentiometric data.

For the conductometric titrations an apparatus similar to that described by McElhinney, Whittemore, and Lynch (McElhinney, T. R., Whittemore, E. R., and Lynch, D. F. J., *Paper Trade J.* 106, No. 10:37-41, March 10, 1938) was used. Tenfold dilutions of the stock solutions were accurately made and proper aliquots of the diluted solutions transferred to a 250 cc. beaker, which served as a titration vessel, containing such a volume of water that the final volume before starting the titration was 170 cc. All dilutions were made with recently boiled and cooled distilled water. The standard acid used was 0.1 N sulphuric and this was added in increments of 1 cc., readings in a given titration being taken after each addition of acid at a constant potential across the electrodes on a 25-ma. ammeter. In cases where aldehydes were present, 5 cc. portions of the commercial preparations were employed per titration.

The recommended method for the determination of total alkali, which in principle involves an acidimetric titration in the presence of furfural to the methyl orange end point or corresponding *p*H employing either potentiometric or color indicator methods of end point detection, offers an advantageous accuracy and expediency when applied to solutions of the general nature of sulphate white or green liquors. The method is inadequate when applied to black liquors due to the presence of colored organic compounds and

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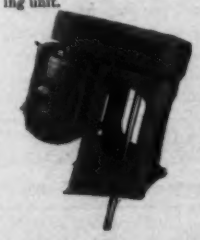

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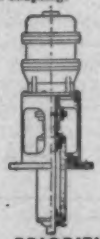

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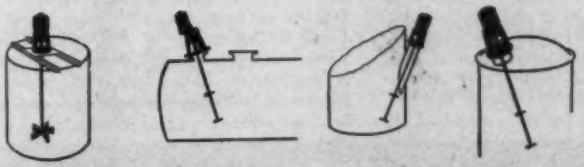

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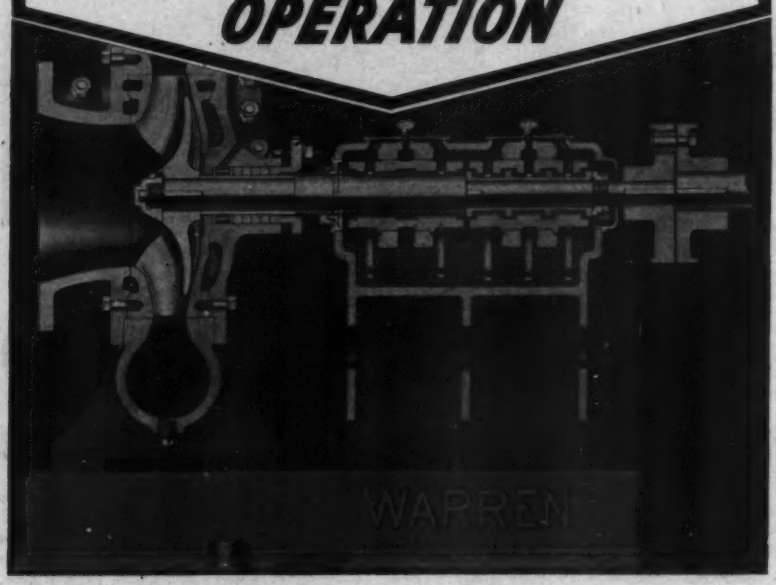

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sodium organic salts which are incompletely neutralized at a *p*H of 4 and which make precise end point detection impossible. It is desirable that the determination of the total alkali content of black liquor include all the sodium organic compounds and afford a reliable basis for the estimation of all sodium ultimately recoverable as active alkali. A conductometric method for the analysis of kraft liquors has been proposed by Whittemore, Aronovsky, and Lynch (Whittemore, E. R., Aronovsky, S. I., and Lynch, D. F. J., *Paper Trade J.* 108, No. 17:33-40, April 27, 1939; *Tech. Assoc. Papers* 22:609-616, June, 1939), which involves the use of a specially designed and inexpensive conductometric apparatus depending for its operation on the measurement of the current flowing through the solution between electrodes maintained at a constant potential by rheostatic adjustment. As applied in this work to a sample of commercial black liquor the method did not seem to provide adequate precision for quantitative differentiation between the different components of the liquor but it did appear promising as a means of measuring the total alkali content. Prompted by the results obtained relative to the effect of aldehydes on the potentiometric titration of the inorganic constituents normally appearing in the liquor, a similar investigation was made relative to the conductometric method.

It appears from the results obtained that the conductometric titration method may afford quite an accurate and reliable measurement of the total alkali content of kraft black liquors.

In view of this there appears to be no advantage in the use of aldehydes in the titration mixtures of such materials as here considered when end point detection is to be made conductometrically and is, in fact, to be avoided, because certain indications as to the composition of the solution derivable from the form of the first portion of the titration curve would thereby be lost or confused. In the case of black liquors, the organic materials present possibly provide the protection against air oxidation of the inorganic constituents which otherwise might be achieved by the use of aldehydes.

Causticizing, Reburning, and Settling in Sulphate Lime Recovery

GEORGE B. HUGHEY,[1] L. KERMIT HERNDON[2] and JAMES R. WITHROW[3]

This research had three objectives: (a) to investigate the influence of sodium sulphide and other constituents present in commercial sulphate green liquors on the causticizing reaction; (b) to furnish some laboratory data on the reburning of typical sulphate lime mud, such as the effect of time and temperature of burning, cycling through the process, and the alkali content of the mud, on the quality of the reclaimed lime; (c) to attempt a correlation of the settling rate of the sulphate lime sludges with the physical properties of the white liquor and the dry mud, involving variations in solid to liquid ratio, temperature, and washing.

The commercial green liquors used in the experimental work were furnished by three southern sulphate paper mills.

The quicklimes used were selected to give a wide range in chemical composition.

The apparatus built for this investigation for carrying out the causticizing reaction and settling rate tests was patterned after the one used by Dorr and Bull (Dorr, J. V. N., and Bull, A. W., "Some Variables Affecting the Behavior of Limes Used in Causticizing," A Symposium on Lime, page 32, *Eng. Exper. Sta. Bull.* No. 35, The Ohio State University, Columbus, O., 1927), with modifications so that two determinations could be carried out at one time. It consisted of a wooden cabinet equipped with a detachable glass front and individual rheostatically-controlled heaters for the two 3,000-cc. beakers and the air. The stirring during causticizing was performed by propeller agitators, belt-driven from a single motor attached to the back of the cabinet. These agitators were hollow and so constructed that they could be withdrawn quickly from the slurry at the start of the settling-rate determination. An electric fan was located directly above the air heaters for the purpose of obtaining a uniform air temperature. The beakers were equipped with covers in which calibrated thermometers were inserted into the slurry. The slurry level and sludge line level were measured to

(1) Chemical Engineer, Merck & Co. (2) Assistant Professor Chemical Engineering, The Ohio State University (3) Professor Chemical Engineering, The Ohio State University.

within 0.5 mm. by adjustable steel rods that extended through the beaker covers into the beakers. These measuring rods had knife edges attached to their upper ends which contacted vertical meter sticks.

The procedure was selected to give consistent results and was not necessarily the one that would give the fastest settling sludge.

The procedure adopted for the determinations of the various alkalies was that given in the TAPPI textbook (Lee, H. N., et al., *The Manufacture of Pulp and Paper*, 3rd ed. vol. III, sec. 5, page 199).

The procedures for the determination of the loss on ignition, silica and insoluble matter, iron oxide and alumina, calcium oxide, and magnesia were adopted from the official TAPPI Standards, "TAPPI Standards and Suggested Methods," T 618 m, 1940).

The availability of the quicklimes was determined by measuring the amount of NaOH produced by a known weight reacting with a large excess of Na_2CO_3 solution. The method consisted of refluxing the lime with the carbonate solution for 3 hours and then titrating the NaOH after the excess sodium carbonate was treated with $BaCl_2$.

The water-soluble alkali in the mud and reburned lime samples was determined by digesting for several hours with a large excess of ammonium carbonate solution, evaporating to dryness, taking up with hot water and washing the free alkali out and finally titrating the washings with standard acid to the methyl orange end point.

The following mathematical expression was derived from the experimental data on causticizing the sulphate pulp mill and the synthetic sulphate green liquors with excess lime:

$$E = 100 - 0.003\,S - 0.00077\,S^2 - 0.04\,F - 0.1\,A$$

where E = equilibrium causticizing efficiency, %

$$\frac{NaOH + Na_2CO_3}{NaOH} \times 100,$$

(all expressed as grams per liter of Na_2O)

$S = (Na_2CO_3 + NaOH + Na_2S)$ in the green liquor in grams per liter of Na_2O.

$F = Na_2S$ in the green liquor as grams per liter Na_2O.

$A = Na_2SO_4$ in the green liquor as grams per liter of Na_2O.

Two samples of lime sludge from sulphate process plants were used in the reburning studies. Both samples were dried at 105 C. before analyzing and calcining.

For calcining temperatures above 1,100 C. a gas muffle furnace and fire clay crucibles were employed.

The effect of increasing the time of burning at the various temperatures indicated an increased completion of calcination at the lower temperatures, but from 1,100 to 1,400 C. the increase from 1 to 2 hours had no effect.

In general, increasing the time of burning from 2 to 10 hours has about the same effect as that of increasing the temperature of burning 50 C.

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The results of recycling lime particles through the causticizing-reburning-causticizing cycle and of reburning at various temperatures indicated that the recovered lime could causticize as well, producing a faster settling sludge than the corresponding new lime and that the most reactive reburned lime was one that was derived from a sludge containing about 0.4 per cent free Na_2O.

The free alkali entrained in the lime sludge lowers the availability of the reburned lime when greater than 1 per cent is present (approximately 1 per cent for each 0.1 per cent free alkali) and also high alkali contents appear to result in the loss of alkali on reburning.

The McCabe-Egolf method for correlating settling-rate data may be applied to the sludges resulting from the causticization of sulphate green liquors, in a much simplified form which is valid over a range of temperatures, solid to liquid ratio, and also dilution or washing.

Multistage Bleaching of Kraft*

SIDNEY D. WELLS[1] and FREDERICK B. SCHELHORN[2]

In the majority of cases the manufacturing units engaged in the bleaching of kraft, to what is considered a bleached pulp of high brightness, employ a first stage which consists of chlorination, using from 40 to 60 per cent of the chlorine demand of the unbleached pulp as chlorine in aqueous solution. This stage is usually followed by washing with water on an acidproof vacuum filter. The pulp is then treated with caustic soda to dissolve the chlorinated lignin, and again washed on a vacuum filter or series of deckers. The washed pulp is then bleached with about two-thirds of the remaining chlorine demand in the form of calcium hypochlorite, maintained alkaline to phenolphthalein by means of the addition of caustic soda solution as often and in as great amounts, as is necessary. From ten pounds to forty pounds of caustic soda per ton of pulp is usually sufficient. The pulp is then washed on vacuum filters or multiple deckers, and subjected to a third bleaching with calcium hypochlorite, using about half of the amount used in the preceding stage. After 85 to 95 per cent of the bleach is exhausted, the pulp is generally washed and sometimes treated with sulphurous acid in the final wash water to stabilize the color and accelerate the removal of bleach residuals. The procedure outlined above may be departed from in minor details in some cases but, in general, it is quite closely followed in the commercial bleaching of kraft pulp at the present time. The major considerations were thought (Wells, Sidney D., U. S. patent 1,883,193, October 18, 1932) to be the chlorination of the unbleached pulp under decidedly acid conditions, the removal of the chlorinated lignin, and the bleaching of the resultant pulps with calcium hypochlorite under distinctly alkaline conditions throughout the bleaching operation. The observations leading to this belief were made by a great many investigators in the period between 1920 and 1935 (Bevan, E. J., and Cross, C. F., *J. Chem. Soc.* 38:666-668, 1880; Wenzl, Hermann, *Papier-Fabr.* 29:55, 1931).

In spite of tacit agreement through general adoption, a patent issued to Sunesson in 1938 (Sunesson, Erik Bror Fredrik, U. S. patent 2,140,863, December 20, 1938) showed that a different sequence was considered worthy of patent protection by at least one well-known manufacturer in Sweden. The procedure suggested therein was to subject unbleached kraft pulp to a treatment with calcium hypochlorite as the first stage, followed (after washing) by a treatment with chlorine, a wash, an extraction with caustic soda solution, a wash, a treatment with calcium hypochlorite and finally a thorough washing. An investigation was consequently undertaken in which the relative merits of both the proposed, and the more generally accepted procedures were studied.

During the course of the experimentation stock densities employed varied from 3-25 per cent. It was imperative that, in all cases, thorough mixing of the pulp and chemical be obtained. Consequently, devices were employed which best suited the particular consistency.

A bleach liquor of calcium hypochlorite was prepared by trituration of dry bleaching powder with a suitable quantity of water. During hypochlorite treatments, the reaction medium was maintained slightly alkaline by the addition of suitable quan-

(1) Research Associate, (2) Graduate Student, The Institute of Paper Chemistry.
(*) A portion of a thesis submitted by the junior author in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wisconsin, June, 1941.

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tities of aqueous sodium hydroxide solution.

Chlorine was introduced as chlorine water which was prepared by passing the gas through a diffuser into cold water.

In all cases the stock was washed with water and subjected to a 2 per cent alkaline extraction for one hour, after which it was thoroughly washed.

Analytical Methods

a) Available chlorine in hypochlorite bleach liquor—TAPPI T 611 m-33

b) Permanganate number—TAPPI T 214 m-37

c) Cuprammonium viscosity—TAPPI T 206 m-37

The pulp used throughout the experimental work was a jack pine kraft which had been cooked to produce a moderately easy-bleaching pulp and was stored in wet laps (about 30 per cent moisture-free basis). The permanganate number and cuprammonium viscosity of the pulp were as follows:

Permanganate number	19.1
Cuprammonium viscosity	67.6

Physical evaluation of the pulp used was carried out in the pebble mill, both at the start and near the conclusion of the experimental work. The determination of the freeness development, burst factor, and tear factor checked closely, so that it may be concluded that no alteration of the pulp characteristics was induced by storage.

In the first experiment, the conditions cited by Sunesson (Sunesson, Erik Bror Fredrik, U. S. patent 2,140,863, December 20, 1938) were followed. The data for the bleach were as follows:

1st Stage—5 per cent available chlorine as hypochlorite at 20 C.

2nd Stage—3 per cent available chlorine as chlorine at 20 C. followed by a caustic extraction.

3rd Stage—1.5 per cent available chlorine as hypochlorite at 30 C.

The chemical consumption in the first stage was rapid and was completed in 20 minutes. The chlorination was slow, however, and required about four hours for exhaustion. The final brightness was 76.5 (General Electric brightness tester).

Strength tests were made on samples of pulp taken at the completion of each of the above stages, and the results at the representative freeness of 550 seconds (Schopper-Riegler) are given in Table I.

The small loss in strength produced by the first-stage hypochlorite treatment was to be expected because of the similarity of this treatment to the semi-bleaching of kraft pulps for envelope paper and gummed tape, in which the papers obtained are usually slightly stronger than those made from unbleached pulp. The loss on chlorination, however, was not foreseen, neither was the time required for exhaustion of the chlorine, which was found to be four hours. In view of these unexpected departures from the common conception that there is little, if any, degradation of cellulose during chlorination at low density and at room temperature and that the rate of reaction in chlorination is usually rapid, a more detailed and comparative study of varying sequence and degrees of treatment were made. The results show that: Chlorination with 5 per cent of chlorine in the first stage is less degrading to the cellulose of bleached kraft pulp from jack pine than with 1 per cent of chlorine in the second stage. The degree of degradation in the second stage is greater, the larger the amount of chlorine used and the longer the period of time taken to consume it. The rate of reaction by the use of chlorine in the second stage is very much slower than its use on the unbleached pulp in the first stage.

Table I—Strength Tests at Freeness 550 S.-R.

	Pebble Mill Revolutions	Bursting Factor	Tearing Factor
Unbleached Pulp	11100	150	1.40
After 1st stage (hypochlorite)	10950	146	1.40
After 2nd stage (chlorination)	10770	138	1.30
After 3rd stage (caustic extraction)	7920	135	1.30
After 4th stage (alkaline hypochlorite)	6840	130	1.25

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is both plentiful and continuous, because *each individual strand* in this packing is impregnated with the lubricant under pressure, while hot, before braiding or twisting. In addition, the non-saponifiable lubricant is specially selected to stand up under caustic alkali service . . . your assurance of long, satisfactory service from CUTNO.

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Chlorination following chlorine treatment is very much more degrading to the cellulose than chlorination following hypochlorite when comparable amounts are used in each stage; the latter is much more degrading than hypochlorite following chlorination.

The degradation caused by increased concentration of chlorine at increased pulp consistencies more than offsets any benefits obtained from reduction in the required time for its exhaustion.

The degradation caused by increased concentration of hypochlorite in the first stage at increased pulp consistencies more than offsets any reduction in degradation by the decrease in the time required for the completion of the reaction.

If the chlorination is stopped with some of the chlorine unconsumed, there is no reduction in the degradation of cellulose to bleach to a standard brightness.

In the second-stage chlorination, the rates of consumption of chlorine and the degradation of the cellulose are closely parallel, so that there is no point at which to obtain optimum results.

In the first-stage chlorination, the rates of consumption of chlorine during the first ten minutes are relatively much greater than the rate of degradation of the cellulose. After 60 minutes, the rates are approximately parallel. It is therefore possible to choose an amount of chlorination in the first stage for any kraft pulp that will permit the required degree of bleaching with minimum over-all reduction in viscosity.

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No other hand trucks combine simplicity of handling with speed necessary for handling as do the Skid-Em-On trucks. Reports from paper mill users throughout the United States and Canada testify to this fact.

There's nothing complicated about Skid-Em-Ons . . . no fancy gadgets or complex mechanism. A roll is rolled onto the truck, nestled gently into a specially-designed cradle and rolled off easily and without effort. Economy, that's the best thing about Skid-Em-Ons. *One man* can handle all operations connected with this truck . . . loading, carting and unloading! Interested? Just drop us a line . . . we'll be glad to supply you with full information.

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Testing Printability of Paper With Ink

F. A. WEYMOUTH
International Printing Ink Division of Interchemical Corp.

The present investigation began a number of years ago as the outgrowth of critical studies of the printing quality of inks. At that time it was observed that paper exerted a profound effect on the results of various ink formulations. Since that time, laboratory experimentation throughout our corporation has included a wide variety of papers, identified as to source and described by other pertinent data.

In 1939 the company with which I am associated made a study (Weymouth, F. A., "Some Observations on the Relation of Coated Papers to Ink," *Paper Ind. and P. World*, July, 1940) of 86 coated papers which were all representative grades manufactured in this country. Great difficulty was encountered in correlating the printing qualities of papers. The correlations were attempted by such instrumentation studies as oil penetration, smoothness, softness, compressibility, picking, formation, *p*H, etc. Further than this, the study led eventually to the proofpress as the final check on printability, a condition which had been reached previously by other individuals. For the most part this technique had been developed by Case who for many years has set the standards of the varied papers used in Sears, Roebuck & Co. catalogs. Heretofore, his technique has not been published, although paper mills have now adopted his methods.

The mechanics involved in some of the previous paper testing methods have either been too complicated or have introduced other factors as the element of time or press speed. The actual time involved in making the printability test is small but the mechanics employed in getting the proper testing conditions is highly important.

An engraver's proofpress such as a No. 4 Vandercook or Hacker test press is used for press testing.

Ideal OX-base rollers covered with a thin glue glycerine coating to 2½ inches diameter are preferred if the Vandercook No. 4 is used. Solid glue rollers are not recommended because they rapidly go out of round. Synthetic rubber or rubber rollers are not recommended because if heat-drying inks are to be tested they involve the factor of solvent absorption into the rollers.

The printing plates must be chosen very carefully so that the human element will be eliminated during the course of testing. Plates mounted on wood blocks are not recommended. Patent base is satisfactory provided the plates mounted on the base are of uniform caliper throughout. We use plates of 0.154 inch thickness and have our engraver submit plates with proofs which are printed with a small amount of ink and light impression. This shows up the low spots (if there should be any) after these precautions. A solid plate 3 inches by 8 inches is ample for making any of these tests to be later described.

IS THE OLD PROVERB ABOUT THE BETTER MOUSE TRAP DEAD?

● Emerson's famous proverb is not **dead** . . . just **incomplete.** For today's products, and felts in particular, must not only be **made** right, they must be **specified** right.

Here is what has actually happened when Orr Felt representatives were given the chance to analyze problems:

One representative studied a problem, selected a certain Orr suction press felt for newsprint that cut steam consumption 500 pounds per ton. Another representative suggested a change in felts for a high-speed kraft application, actually increasing machine speed 26%. And still another man recommended a change in wet felts for hi-speed tissue, resulting in an increase in average felt life of from 40% to 60%.

Orr representatives are felt experts. When one calls on you, let him put his unique knowledge to work for you. His suggestions have often led to valuable savings.

ORR FELTS

THE ORR FELT and BLANKET CO.
PIQUA, OHIO

The actual testing is a simple operation. Strips of the paper to be tested and the standard sample are cut approximately 2½ inches by 10 inches. The sample to be tested is underlayed with that of the standard and vice versa and the pairs are then placed side by side and attached to a third piece of paper with scotch tape at one end, taking care that both wire and felt sides are kept in comparable positions. One to four samples are prepared depending upon what information is desired.

In correlating hand proofs with the commercial press, we often obtain some pick on the hand press and not on the commercial machine. The reason for this is that the ink is broken down by the press rollers of the commercial press and the printing machine becomes warm so that the viscosity of the ink is lowered. The test, however, on the paper samples is still relative.

The results obtained from this method of testing have eliminated many factors often present in printability testing. They have also added certain desirable features. By this method the same printing pressure is used and the prints are pulled at exactly the same press speeds. The plate is mechanically inked which eliminates the human factor. The factor of resiliency of printing pressure has been equalized by backing up one sheet with the other which at the same time compensates for any slight differences in caliper. By previously carefully preparing our rollers, plates, and suitable adjustments of press packing, we have controlled many of the factors not present in commercial trials or other instrumentation studies.

Any junior chemist or laboratory assistant after a period of practice can become quite proficient in making these tests provided due care has been exercised in preparing the samples, printing plates, and rollers. After the press has been set up it need not be changed. The press rollers should be checked once a day which is a matter of a few seconds with the gauge provided. The actual press time needed to make printability tests or pick tests including washing up the press after the test is ten minutes or less.

The entire cost of such a press, plates, patent base, and a double set of glue glycerine rollers is nominal.

A typical example of the possible benefit of this method of testing is given in the following example:

Two paper mills are making paper for the same publication. The forms are arranged in such a manner that the paper from one mill is used on half of a press run and the other half of the run is made with the competing paper. Paper A is a soft paper with a low picking point and is an easily printed paper. Paper B would be described as a hard paper with a high pick test. Paper A requires about 30 hours makeready time on a 4-color press. Paper B requires at least 40 hours makeready time. Both papers are sold at the same price and the printer is able to get equal press production so that he has identical final costs with both papers. However, during the printing of Paper A there are more shutdowns because of picking trouble. Paper B, however, requires more changing of tympan sheets in order to keep a good impression. Both paper mills are satisfied that their paper is doing a job, which is neither an overstatement nor an understatement. If both mills were to use the printability testing method, it is reasonable to expect the mill making Paper A would bring up the resistance to picking and the producer of Paper B would make it more printable. These changes would result in increased production for the printer.

Our Chicago Products Development Laboratory is at the service of any paper mill interested in checking or adopting this method of checking printability by the use of the proofpress.

Acknowledgment—The author wishes to express his appreciation for the advice of H. N. Case of Sears, Roebuck & Co., the originator of many of the basic methods upon which the writer relied, and to others whose contributions to the literature have been used as a guide.

NEW EQUIPMENT AND SUPPLIES

New Type of Revolving Joint

Barco Mfg. Co., 1801-1815 Winnemac Ave., Chicago, has announced a new type of revolving joint for the handling of steam, air, gas, water, and other fluids. This joint, designated as *Barco Revolving Joint* 7RB-8CRB, is equipped with a ball race, arranged so that the sleeve may move in or out slightly, thus compensating for expansion and contraction of steam heated and cooling rolls. Two ball seals permit a slight

flexing angle to relieve strain on piping due to pulling together nipples and unions. Also, the chevron pack seal is maintained by constant pressure of a spring against the packing. The joint can be repacked, when necessary, without removing the threaded sleeve from the roll.

Corrosion Inhibitor

The D. W. Haering & Co., Inc., 205 W. Wacker Drive, Chicago, has announced the development of a corrosion inhibitor. Identified as *ferri chrom glucosate*, the inhibitor is a colloidal gel which is non-irritating to handle. According to the manufacturer, it may be used for film formation in process operations by dipping or spraying, or it may be incorporated in paints or lubricants for corrosion control.

Specular Reflection Neutralizer

Truscon Laboratories, Detroit, Mich., has announced a new material *(VD glaze)* for use in blotting out reflection from specular surfaces. Available as a clear, white translucent product or in tints, the material may be applied to glass, steel, concrete, over paint, etc. The tints are made to simulate standard army camouflage colors. If applied to the outside windows on a southern exposure, this product, according to the manufacturer, will keep out the glare of bright sunlight and will reduce the temperature within the work room.

Automatic Chemical Sprinkler System

An automatic chemical sprinkler system for extinguishing fires has been announced by the Bancroft Chemical Sprinkler Co., 82 Foster St., Worcester, Mass. The principle upon which the system is based is similar to that of a standard water sprinkler system, except that a chemical fire extinguisher is used in place of water. Constant pressure on the extinguishing liquid, is maintained by an air compressor which is driven by an electric motor actuated by a pressure switch. The melting of a fuse link, in the event of a fire, causes a sprinkler head to open, thereby permitting the extinguishing liquid to be sprayed out under pressure. Immediately upon contact with the flame or heat, according to the manufacturer, the extinguishing liquid forms a heavy blanket of vapor which consumes the heat, displaces the air, and stops combustion.

Time Schedule Controller

Taylor Instrument Cos., Rochester, N. Y., have announced a controller for maintaining temperature, pressure, flow, or liquid level according to a predetermined time schedule. Both the cam and chart are individually mounted and conveniently located for instant visual comparison. Among the improved features of this controller, cited by the manufacturer, are: (1) friction drive cam assembly which permits rotation of cam without loosening any locking means; (2) improved means of resetting one cam without disturbing the other in an instrument with two complete control mechanisms; (3) each cam capable of operating from one to four air valves; microswitches or both for the actuation of any external mechanism such as a valve, bell or light, doing this automatically in any desired relation of one to the other; and (4) the automatic return of the cam to the starting position.

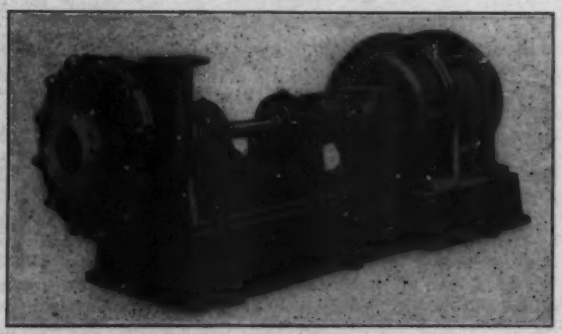
An optional feature of the controller is an interrupter timer which allows the use of a very fast cam clock for a rapid rising period, but reduces the speed of the clock to increase the length of the holding period. The rising period, the holding period, or both may be increased as much as 6½ times normal period, the timer being built right in the controller.

By the addition of pre-calibrated assemblies, the controller can be converted to fit any future process requirements.

Constant Level Lubricator

Oil Rite Corp., 3466 S. 13th St., Milwaukee, Wis., has announced an oil lubricator, which holding a visible reserve supply of oil, automatically releases as much oil as is needed to maintain a constant predetermined level of lubricant. The base of the lubricator is cast of Zamak metal. Integral with the base is an open air vent which extends part way up into the oil reservoir. An inverted bucket, or bell, also cast of Zamak metal, fits loosely over the vent. The reser-

PUMPS THAT PAY PROFITS



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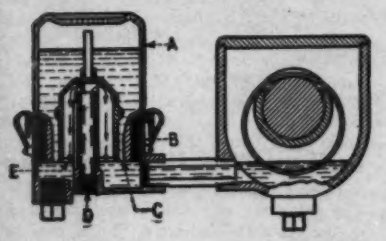
voir proper is a glass dome, sealed to a metal collar with plastic porcelain cement. Two spring clips lock the reservoir in position on the base.

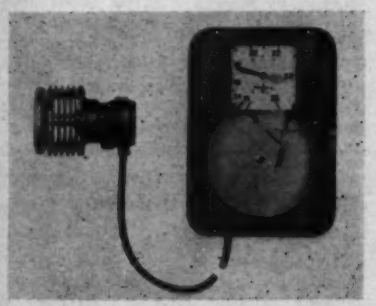
When the reservoir (A)—see illustration—is in position on the base (B), the lower edge of the inverted bucket (E) determines the oil level which the lubricator will maintain. When the level falls below this point, air from vent (D) escapes under the side of bell as at (C) to the top of the lubricator, thus permitting oil to flow down from the reservoir until the level to be maintained again seals across the base of the bell. The



lubricator is available in four standard sizes—capacities of 2, 4, 8, and 16 oz. Outlet tappings are provided at both side and bottom of base, and oil level to be maintained is indicated. Air vent can be provided with filter if desired, or can be installed with breather tube connected to bearing.

Radiation Pyrometer

A new radiation pyrometer, known as the *Pyrovac*, has been developed by The Bristol Co., Waterbury, Conn., for recording, indicating, or automatically controlling temperatures in furnaces and kilns above 900

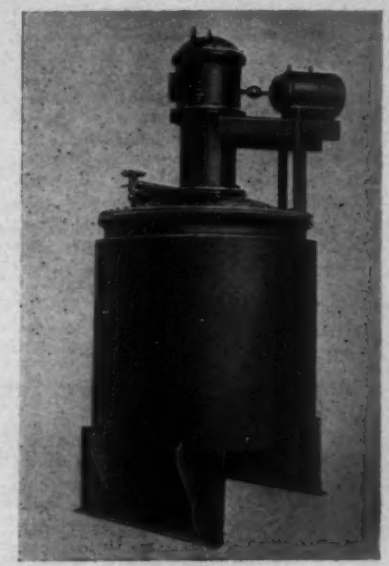


Fahr. The temperature-sensitive unit or radiation head of the unit is mounted on the outside of the furnace, outside of the hot zone, where it picks up heat rays from the object under measurement, thus registering its surface temperature.

Mixer for Heavy Materials

A mixing tank with three means of agitation has been developed by L. O. Koven & Brother, Inc., Jersey City, N. J. The tank may be made of steel or any other metal to suit; also it may be provided with an outside jacket to permit heating or cooling of its contents during the mixing operation. Mounted within the tank is a vertical shaft upon which are positioned two agitators—a turbine type impeller at its bottom end, and a three-blade ship type propeller above it at any desired point. The shaft is driven from the top through a motor and speed reducer. A radial and quadrantal arrangement of four baffles, mounted several inches away from the inside wall of the tank is the third means of agitation.

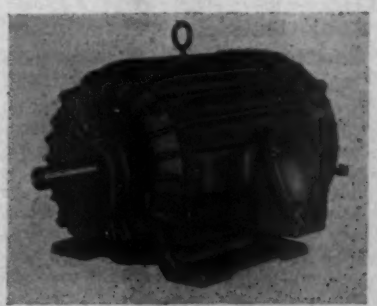
Rotation of the propeller causes the mix to be sucked down toward the turbine which, because of the pitch of its blades, gives it a combined peripheral and upward motion. As some of the mix strikes the baffles, it is turned back to be given a rotary



kneading or turn-over action. At the same time, some of the mix flows between the baffles and the inside wall of the tank, thus giving it a shearing action. Thus, the entire mass, according to the manufacturer, is subjected to a continuous suction, dispersion, kneading, and shearing cycle, which disintegrates and distributes uniformly solids in a liquid vehicle and homogeneously mixes two or more fluids of dissimilar specific gravity and viscosity.

Fan-Cooled Motor

Crocker-Wheeler Electric Mfg. Co., Ampere, N. H., has announced the development of a fan-cooled motor, the *Cowl-Cooled*, so designed that ventilating air is blown over external ribs running lengthwise of the frame. Available in standard N.E.M.A.



frame sizes up to 20 hp., either ball- or sleeve-bearing equipped, the motor is suggested by the manufacturer for all applications where the conventional type of totally-enclosed motor previously has been recommended.

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TECHNICAL DEVELOPMENTS

These abstracts are of the latest developments found in the American and foreign press.

Study of Various Celluloses

This involved a comparison of the properties of the original and deliberately degraded natural fibers with artificial fibers. Bleached sulphite and purified cotton linters, and cellulose regenerated from viscose and commercial viscose staple fibers were studied.

The methods of degradation included (1) treatment with NaOH and aging; (2) treatment with dilute HCl at 53 C.; (3) heating in air at 120 C. The overall degree of polymerization (d. p.) of various preparations was derived from viscosity measurements in cuprammonium. Swelling was also studied. Sulphite pulp, degraded by heating to a point at which the average d. p. is that of commercial viscose staple fiber is partly soluble in 10 per cent NaOH at + 5 C. The soluble fraction may be precipitated with acids, and the proposal is to apply this in the possible manufacture of staple viscose fiber. With regenerated cellulose, NaOH may be used as solvent in determining d. p. The figures thus obtained agree closely with those found in cuprammonium.

Staple fiber and native cotton in mixed fabrics may be separated by the use of strong NaOH in which only the former is soluble. Here the alkaline solution may be used for determining the d. p. of the staple fiber. The d. p. of the residual cotton can be determined in cuprammonium solution. (Eight tables are given. O. Eisenhuth, Cellulosechemie, 19, No. 3, 45, 1941.)

Groundwood at 5,400 Surface Feet Per Minute

By using a coarse board-type artificial stone (27 x 54 inches) operating at a peripheral speed of 5,400 feet per minute (in a commercial sized 4-pocket Carthage grinder) a groundwood was obtained similar in all respect to that produced elsewhere in the grinder room. Other (natural) pulpstones operated at an average peripheral speed of 3,200 feet per min. The output obtained at the higher speed was more than in direct proportion, however, to the speed increase over that of the other grinders. This result may be due to elimination of lost time during pocket filling (owing to the method of operating the high speed grinder while the test was in progress), as well as to the difference in the coefficient of friction of the high speed stone and of the other stones in the grinder room. Unit energy consumption was independent of speed.

In the Roberts' grinder, the board-type stone was difficult to control, and the grinding position (the down-running side) practically nullified the effect of increased grinding speed. A stone of finer grading produced pulp comparable with that of the grinder room, and with it, the paper-machine trial runs proved satisfactory. For comparable pulp quality, the data given do not indicate lower power costs per ton than those obtained with pocket grinders. An appendix gives methods for computing results with the high speed stone. (J. B. Jones and W. W. Holland, Pulp & Paper Mag. Canada, 43, 141-4, 146, 1942.)

Burning Sulphite Waste Liquor

The original article (which is available only in the form of the Swedish abstract) describes a plant evaporating and burning sulphite waste liquor obtained in the manufacture of beech wood pulp. The liquor, collected in diffusers, is neutralized with lime prior to its evaporation in a quadruple-effect evaporator. The concentrated liquor, together with powdered coal is burned under water-tube boilers. The installation made of copper increases the present production costs about 10 R. M. per ton of bleached sulphite pulp. If acid-resistant steel is used, this cost is increased by another R. M. 3.8 per ton.

These same data do not apply to spruce wood pulp where the total solids in the liquor are lower, and the dilution greater. Reference is made to the so-called Ramin process, which causes the conversion of the liquor to a powder that can be burned without the further addition of fuel. (J. von Lassberg, Papier-Fabr. 39, No. 44/5, 262, Nov. 8, 1941; Svensk Papperstidn, 44, No. 24,560, Dec. 1941; through Bull. Inst. Paper Chemistry, Vol. 12, No. 10, June, 1942.)

Soda Pulping of Canton Fiber

Canton fiber (of the *Musa* species, which is related to our edible banana) has an average length of about 4 mm. (variations 2.6-6.8) and an average diameter of 0.016 mm. (0.011 to 0.022 mm.). The following analytical results were obtained on the original fiber:— 7.71 per cent alcohol-benzene soluble matter, 13.2 per cent cold water soluble matter, 35.8 per cent soluble in 1 per cent NaOH, 14.6 per cent pentosans, 22.9 per cent lignin, 5.2 per cent ash, and 50.0 per cent total cellulose (43.6 per cent alpha-cellulose). A small laboratory experiment in which oven-dried material was digested with a 2-3 per cent NaOH at 155-60 deg. for 8 hours, gave 33 per cent of a pulp containing 69.5 per cent alpha cellulose, 8 per cent pentosans, and 5.5 per cent lignin, which is difficult to bleach. The resulting sheets are comparable in strength to that of wrapping paper (imported into the Philippines). Mariano P. Ramiro, and P. A. Estrada. Philippine J. Sci. 75, 75-81 (1941), through Bull. Inst. Paper Chem. 12, 225 (1942).

Jute in Papermaking

The authors discuss the structure of the fiber, its behavior towards common scouring, and bleaching liquids together with processive conditions of waste jute in producing strong wrapping paper (brown), partially bleached buff envelope and bag papers, and good quality bleached papers. B. P. Ridge and A. H. Little. World's Paper Trade Review, 116 TS: 77-80, 81-4, 86-8 (1941); through C. A. 2135 (1942).

Sodium Chlorite in Pulping

(The original article is not available. The following is based on the translation of the Swedish abstract.) Wood may be pulped by using sufficiently large amounts of sodium chlorite at 50-60 C. The pulp yield is good and the color is very white. The high degree of polymerization is also maintained. Buffering agents (pyridine, sodium acetate or Na_2HPO_4) appear not only to accelerate the reaction, but have a beneficial effect on maintaining d. p. and on color. Since the hemicelluloses remain largely unattacked, the alpha cellulose content of the pulp is low. The product is only partly soluble in cuprammonium hydroxide. Using $NaClO_2$ in low concentration, a pulp may be obtained from potato stalks and straw. These chlorite pulps give a strong paper after brief beating periods,—a fact ascribed to high d. p. and to the hemicelluloses present. (A. W. Sohn and F. Reiff, Papier—Fabr. 40, No. 1/2, 1-7, 1942; through Svensk-Papperstidn 45, No. 7, 140, April 1942; and Bull. Inst. Paper Chemistry, June, 1942.)

The Wood Cellulose Determination

Since the use of wood pulp in rayon manufacture has assumed increasing importance, accurate cellulose determinations are desirable. The difficulty inherent in wood cellulose analyses is that the resistant cellulose is readily degraded when attempts are made to remove hemicelluloses. The analyses should therefore always be accompanied by a d. p. determination.

In reviewing the present analytical methods, the authors find widespread disagreement in the experimental results. The following method is suggested in order to maintain a reasonable d. p. of cellulose (ca. 1,000-1,200):—ClO_2 for the separation of the skeletal substances. This in large measure preserves the polysaccharides of the cell wall. From this residue the cellulose is isolated by dissolving out the short chain hemicelluloses with aqueous NaOH, in an atmosphere of nitrogen. (H. Staudinger and E. Husemann. Holz, Roh- u Werkstoff, 4, No. 10, 341, 1941, through Svensk-Papperstidn, 45, No. 7, 139, 1942 and Bull. Inst. Paper Chemistry, June, 1942.)

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Special features adapted especially to paper board mill requirements are the water-cooled mill roll brake, and the large diameter rewind drums which avoid cracking the web when threading up the machine.

Write for interesting folder.

CAMERON MACHINE COMPANY, 61 Poplar Street, Brooklyn, New York
MIDWEST OFFICE: Harris Trust Building, 111 West Monroe Street, Chicago

New Catalogues, Ass'n Reports, and Publications

De Laval Steam Turbine Co., Trenton, N. J.—This company has just issued a chart for quickly determining the drop in pressure accompanying the flow of air or gas through pipes of known diameter and length. An auxiliary alignment chart provides for reducing pipes of different diameters to equivalent lengths of a single diameter in order to simplify the calculation for systems containing piping of various diameters.

E. I. du Pont de Nemours & Co., Wilmington, Del.—"Fairprene' Cement, a New Industrial Adhesive," is the title of a new technical service manual. The seven grades of "Fairprene" cements and caulking compounds available, together with physical properties, vulcanization, permeability to gases, resistance to oils and chemicals, some industrial applications, how best applied, and special instructions are discussed within the bulletin. Copies may be obtained by addressing the "Fabrikoid" Division of the company at Fairfield, Conn.

Eastwood-Nealley Corp., Belleville, N. J.—The importance of paper is dramatically presented in the new brochure "Paper . . and the War Effort." Numerous illustrations aid in pointing out the necessity of paper on the home front, and on the production line, as well as in the training, organizing, and maintaining of our fighting forces.

Everlasting Valve Co., Jersey City, N. J.—An informative 32-page bulletin has just been published, describing this company's quick-operating valves for blow-off, water columns, and other boiler room services. It contains many illustrations which clearly show the design and construction of the various valve types. Complete tables of specifications, dimensions, and prices are also included. Copies may be obtained from the company by asking for Bulletin E-100.

Keystone Carbon Co., Inc., Saint Marys, Pa.—Catalog K-15 concerning Keystone carbon, graphite, and metal-graphite brushes has recently been issued. Popular types of metal-graphite brushes for low voltage generators and slip ring applications, and carbon-graphite brushes, for motors and generators, are illustrated. This publication also contains base prices of standard sizes of brushes and gives a simple method for computing prices for each style. Copies are available upon request.

General Electric Co., Schenectady, N. Y. —Bulletin 3756 is entirely given over to a description of the new 25-ton Diesel-electric locomotive for industrial switching. The various features of manufacture and operation are thoroughly discussed and illustrated. Copies available on request.

B. F. Goodrich Co., The, Akron, Ohio—More timely than ever before is Catalog Section 2800, "Care and Maintenance of Conveyor and Elevator Belting," just released. The 24 pages contain vitally important instructions for the care and maintenance of belting, as well as chapters containing a wide range of belt data, valuable when considering installation or repair problems.

Leeds & Northrup Co., Philadelphia, Pa.—Catalog N-27 describes in detail instruments which measure and automatically record speed of rotating machinery with high accuracy and reliability, thus enabling users of rotary kilns, dryers, paper machines, and other continuous process machinery to hold critical speeds within close limits. For copies, address the company at 4934 Stenton Ave., Philadelphia.

Lincoln Electric Co., The, Cleveland, Ohio—The "Fleet-Fillet" technique of arc welding for speeding up production of welded ships, tanks, guns, and other war-vital products is described and illustrated in a new bulletin 432. Text explanation, photos, and sketches compare the "Fleet-Fillet" and conventional techniques as regards angle of electrode, weld penetration, weld strength, deposited metal, and speed of welding, for both single and multiple-pass welds. Copies upon request.

Magnus Chemical Company, Inc., Garwood, N. J.—This company has just issued a new 24-page Bulletin 62 entitled "The Cleaning of Industrial Floors." Cleaning of practically every type of flooring material used in all types of buildings is discussed, from the viewpoint of personnel safety by the elimination of greasy, slippery floors, as well as for cleaning floors for longer floor life. Copies may be obtained from the company.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn.—"Priorities Mobilize Production for Victory" is the title of a new 16-page booklet. This unique booklet explains priorities and preference ratings and endeavors to make them understandable and usable.

Mine Safety Appliances Co., Pittsburgh, Pa.—Essential emergency safety equipment for plant protection and public safety departments is completely described in a new 8-page bulletin. In addition, three new special items: the M. S. A. steel helmet, the M. S. A. defense first aid belt, and the M. S. A. combination traction splint, are introduced. Copies of this bulletin, No. G-5, may be had upon request.

New Jersey Zinc Co., The, New York, N. Y.—The application of paint for camouflage purposes is the feature of the very interesting publication "Paint Progress." Other subjects treated include the use of paint as a substitute for zinc in the galvanizing process for the protection of iron and steel, and the prominent part paints of high light reflection value can play in creating better lighting conditions in industrial plants.

Roller-Smith Co., Bethlehem, Pa.—Descriptions and illustrations of low-voltage air circuit breakers designed for use on alternating current circuits up to 600 volts and direct current circuits of 250 or 750 volts are contained in a new 12-page publication, Catalog 2150. This publication also lists closing and tripping currents, shows typical methods of making connections to large breakers, gives dimensions of both manual and electrical designs, and indicates the number and size of terminals for various capacity breakers. Copies are available.

Sarco Co., Inc., New York, N. Y.—A new bulletin covering Sarco self-operated temperature regulators for water heaters and industrial process applications has recently been issued. It contains detailed data regarding temperature regulators, as well as many diagrams describing operation.

Books

The Electron Microscope—The authors of this book are E. F. Burton, head of the Department of Physics and Director of the McLennan Laboratory, University of Toronto, and W. H. Kohl, Development Engineer, Rogers Radio Tubes, Ltd., both pioneers in introducing the electron microscope to American science and industry. The book, profusely illustrated and containing a general bibliography, approaches the subject very fundamentally by first discussing such subjects as vision, light microscopes, light, wave motion and wave motion media, wave theory of light, electromagnetic theory of light, the electron, dual theory of light, dual theory of the electron, motion of electrons in electrical field, electrostatic electron mirrors and lenses, and magnetic lenses. With this fundamental background of material, the book proceeds with the presentation of the following chapters, The History of the Electron Microscope, The Electrostatic Electron Microscope, Applications of the Electrostatic Electron Microscope, The Compound Electron Microscope-Magnetic Type, and What the Electron Microscope Can Accomplish. The price of the book is $3.85 a copy; the publisher, Reinhold Publishing Corporation, 330 W. 42nd St., New York, N. Y.

Pulp and Paper Microscopy (Second Edition)—The author of this loose leaf volume is John H. Graff, Research Associate, Instructing in Microscopy, The Institute of Paper Chemistry. Primarily intended for instruction of students in fiber microscopy, the book covers the following subjects. microscopic equipment needed in the pulp and paper mill, micrometry, fibers and fiber elements, fiber analysis, miscellaneous stains and reagents, speck count and speck analysis, and microtome sectioning. Mr. Graff in the preface to the volume mentions that part of the material has been collected from the technical literature and that the rest is a collection of data obtained through many years of work and study. Assembled in an attractive and durable looseleaf binder, the work is priced at $5.00 a copy by The Institute of Paper Chemistry, Appleton, Wis.

The Recovery of Vapors (with special reference to volatile solvents) — Clark Shove Robinson, Department of Chemical Engineering, Massachusetts Institute of Technology, the author of this book, comments in his preface that it has been his object to present in as simple and complete form as possible the fundamental principles involved in the recovery of vapors, illustrating them with numerous examples, to discuss briefly the various factors entering into the design of recovery equipment, and to give descriptions of standard forms of apparatus in more common use. He adds that the book is not a reference book nor is it a complete treatise on the subject, but rather it is a course of study in the basic theory of the recovery of vapors for the benefit of engineers and others who find that they need elementary information on the subject. Among the numerous chapters in the book are the following, Gases and Vapors, Vaporization, Liquid Mixtures, Adsorption, Commercial Activated Carbon Systems, Solvent Recovery by Condensation at Constant Pressure, Condensation with Cooling Water, Cooling with Refrigeration, Solvent Recovery by Compression and Cooling, Solvent Recovery by Scrubbing, and Special Absorbents. The book, published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., is priced at $4.75 a copy.

Resins, Rubbers, Plastics—An abstract service of the current scientific and technical literature devoted to the field covered by the title has been announced by Interscience Publishers, Inc., 215 Fourth Ave., N. Y., N. Y. Edited by Professor H. Mark, Polytechnic Institute of Brooklyn, and Dr. E. S. Proskauer, the publication, already started and of which twelve issues are scheduled for release during 1942, is to feature abstracts so comprehensive that they contain most of the

data and facts of the original paper, including important graphs, curves, or apparatus. This reference work will be subdivided into two parts; namely, general, and special. The general part will combine all information which does not refer to a specific chemical compound or group of substances, but which is characteristic of or important to a large part of the reviewed field. The special part will be subdivided according to substances or substance groups, as acrylic resins, cellulose plastics, butadiene rubbers, etc.

Association Reports

All of the orders which affect the industry emanate from the OPA and WPB and clear through the office of E. W. Tinker, executive secretary of the American Paper and Pulp Association. Copies of all government orders are sent by the Association to members. Listed below are releases sent out during May by the APPA. Any correspondence with that office regarding these releases should carry identifying numbers under "National Defense."

Legislation and Public Affairs No. 112 —Supplemental Price Regulation No. 129 Amendment to Price Schedule No. 32. This regulation became effective May 11, 1942, at the same time as the over-all General Maximum Price Regulation, issued by OPA.

Legislation and Public Affairs No. 115 Inventories of Wood Pulp. Wood Pulp Allocation General Preference Order M-93 expired on May 1, 1942, and now inventories are controlled by the Pulp Allocation Board.

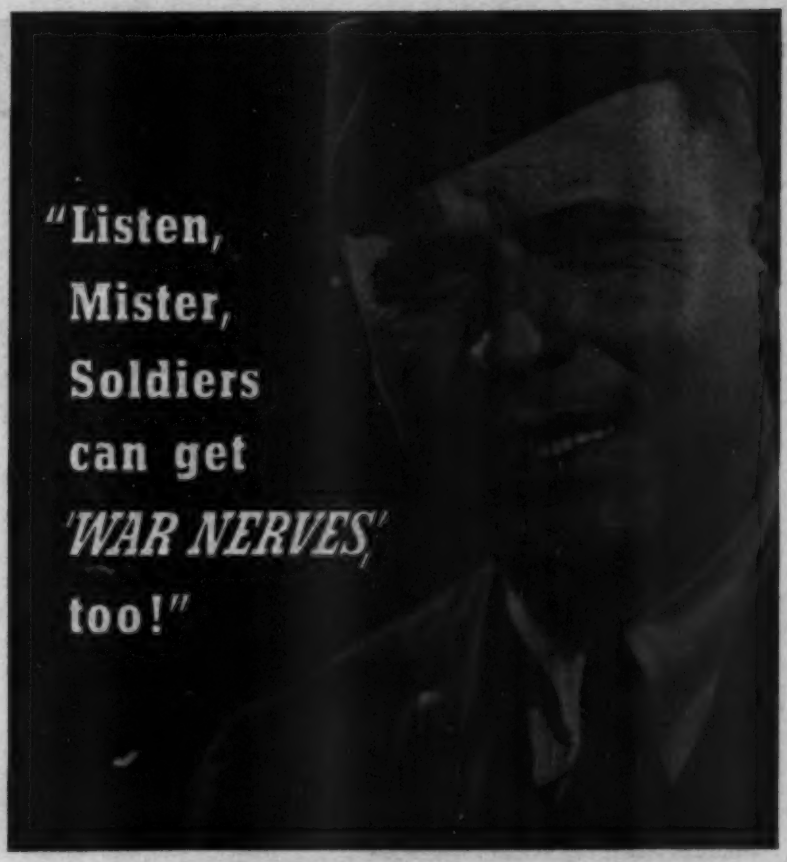
Legislation and Public Affairs No. 118 —Copper Scrap and Copper Alloy Scrap Revised Price Schedule No. 20. This schedule became effective May 11, 1942, and now includes Bronze Paper Mill Cloth. This nullifies National Defense Letter No. 66.

Legislation and Public Affairs No. 122 —Wastepaper—Amendment No. 3 to Revised Schedule No. 30. This amendment, effective May 18, removes the ceiling prices of unsorted wastepaper to dealers for the purpose of grading and sorting for resale to consumer mills. The ceiling is not removed, however, if the wastepaper is sold direct to a consumer, the price will remain the same.

Legislation and Public Affairs No. 125 —L-117 Heavy Power and Steam Equipment limits delivery of Heavy Power and Steam Equipment as defined (List A) to orders for defense agencies, United Nations and Lend-Lease, and orders having a rating of A-9 or higher. It does not limit repairs to present equipment to A-9 or higher, and the A-10 under P-100 can still be used for that purpose.

Legislation and Public Affairs No. 126 —L-121 Construction Lumber makes it unlawful for sixty days after effective date to buy or sell construction lumber except from retailers or producers who produce or sell under 5,000 board feet per day. A considerable amount of the lumber used by paper manufacturers for crating, skids, etc., is, according to the definition, construction lumber.

Legislation and Public Affairs No. 128 — Transportation — Changes in O.D.T. Regulations. The Office of Defense Transportation has postponed from June 1, 1942, to July 1, 1942, the effective date of the provisions in General Orders O.D.T. 4 and 5, requiring contract and private trucks to carry a return load of not less than 75 per cent of capacity as determined from the formula in Appendix 1 of these orders. This action permits the movement of pulpwood and other materials by the trucks of the paper and pulp industry, or other carriers, after June 1, 1942, without having to secure return loads.



(A sergeant speaks his mind)

"I'm going to give it to you straight.

"We read a lot of stuff about how civilians are fighting 'war nerves.' Going to shows...dancing...reading... having fun to relax from all the grimness today and keeping up their morale.

"Sure, it's a good idea, but don't forget this. Soldiers and sailors can have 'war nerves,' too. I don't mean anything to do with courage and stuff like that. Believe me, they got plenty of nerve to take it—and dish it out—whatever the orders are.

"What I mean is that soldiers, maybe even more so, need shows and dancing and decent places to go when they're on leave. Boredom and monotony during their time off are as bad enemies as any goose-stepping German or Jap. We got to fight them, too.

"That's why everybody in this man's army gives thumbs up to this USO. They're doing a job, Mister. Fighting a fight.

"They're putting on swell shows... running club-houses...providing reading matter...taking care of troops in transit...following the flag wherever the army orders with their mobile units. They're spelling morale in our language with a capital M.

"So listen, all you folks. Next time you see a show or do a little rug-cutting or read a book or light a smoke or just sit down to play a game of gin-rummy or listen to the radio in your nice comfortable living room, just remember that there's lots of guys in O. D. and blue that can also use some of same.

"It all adds up to this...we like the job the USO is doing for us...and we hope you on the home front keep it rolling!"

The war chest against "war nerves" needs replenishing. Soon you'll be asked to help. Well, you heard what the sergeant said!

* * *

Send your contribution to your local USO Committee or to National Headquarters, USO, Empire State Building, New York City.

Give to the USO

CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f.o.b. New York City

NEW RAGS

	per cwt.
Blue Overalls	5.75 to 6.00
Corduroy	2.75 to 3.00
Cottons—	
Washables, No. 1	3.00 to 3.25
Fancy Percales	4.40 to 4.60
New Soft Blacks	3.75 to 4.00
New Light Seconds	2.75 to 3.00
New Dark Seconds	2.50 to 2.75
Khaki Cuttings—	
Mixed	3.50 to 3.75
O. D.	4.00 to 4.25
New White Canvas	8.00 to 8.50
New Mixed Blacks	3.00 to 3.25
Shirt Cuttings—	
New White No. 1	7.75 to 8.00
Silesias No. 1	5.25 to 5.50
New Unbleached	7.75 to 8.00
Fancy	3.50 to 3.75
Linen Cuttings—	
White	14.00 to 14.50
Grey	13.50 to 14.00

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

OPA ceiling prices in sales to consuming mills f. o. b. cars at points of shipment, with brokers' allowances of $1 to $2 a ton depending on the value of the grade involved.

	per ton
Roofing—	
No. 1	31.00
No. 2	29.00
No. 3 and No. 4	27.00
Twos and Blues—	
Repacked	44.00
Thirds and Blues—	
Repacked	44.00
Miscellaneous	36.00
Whites, No. 1—	
Repacked	76.00
Miscellaneous	64.00
Whites, No. 2—	
Repacked	58.00
Miscellaneous	53.00

RAGS (Foreign)
ex dock New York City

NEW RAGS — per cwt. — Nominal

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)
ex dock New York City

OLD RAGS — per cwt. — Nominal

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shapperies

ROPE and BAGGING
f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	5.00 to 5.35
Wool Tares—	4.50 to 4.75
Light	4.75 to 5.00
Heavy	
No. 1 Scrap Bagging	4.25 to 4.50
Manila Rope—	
Foreign	—
Domestic	*115.00-
New Burlap Cuttings	5.50 to 5.75
Jute Threads—	
Foreign (Nom.)	5.25 to 5.75
Domestic	5.50 to 6.00
Strings—	
Sisal	3.75 to 4.00
Soft Jute	4.75 to 5.00
Mixed	1.25 to 1.50

*OPA ceiling price per ton f. o. b. shipping point.

WASTE PAPER

OPA ceiling prices in sales to consuming mills f. o. b. points of shipment East of Rocky Mountains; additional $1 a ton loaded on freight cars and brokers' commissions of 4 to 9 per cent allowed.

	per ton
Shavings—	
White Env. Cuts, One-Cut	67.50-
Hard White Env. Cuts	62.50-
Hard White, Unruled	57.50-
Hard White, Ruled	50.00-
Soft White, One-Cut	57.50-
Soft White, Misc.	42.00-
Fly Leaf, No. 1	33.50-
Fly Leaf, No. 2	22.50-
Fly Leaf, Woody, No. 1	25.00-
No. 2 Mixed Col. Woody	18.00-
Mixed Colored	15.00-
Flat Stock—	
Overissue Magazines	33.50-
No. 1 Heavy Magazines	31.50-
Mixed Books	20.50-
Ledger Stock—	
No. 1 White	43.50-
No. 1 Mixed (Colored)	37.50-
Manilas—	
New Env. Cuttings	53.00-
New Env. Cuts, One-Cut	57.50-
Extra Manilas	37.00-
Manila Tab Cards, Free of Ground Wood	45.00-
Colored Manila Tab Cards, Free of Ground Wood	30.00-
Ground Wood Manila Tab Cards	27.00-
Ground Wood Manila Tab Cards, Colored	20.00-
Kraft—	
Envelope Cuttings	65.00-
Mixed Env. or Bag Cuts	55.00-
Tripled Sorted No. 1 Brown	50.00-
New 100% Cor. Cuts	45.00-
No. 1 Old Assorted	35.00-
News—	
White Blank	33.00-
Overissue	17.00-
No. 1 Baled	13.00-
Old Corrugated Boxes	20.00-
New Corrugated Cuts	21.50-
Box Board Chips	14.50-
No. 1 Mixed Paper	14.00-

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.25-
Ground, cwt.	4.00-
Powdered, cwt.	4.40-
Blanc Fixe—	
Pulp, bulk, ton	40.00 to 46.00
Dry, barrels, pound	00.00 to -
Bleaching Powder—	
Drums, cwt.	2.25 to 3.10
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	19.00 to 20.00
80-100 mesh (bags), lb.	20.00 to 21.00
Argentine, lb.	19.00 to 20.00
China Clay—	
Domestic Filler Bulk (mine) ton	7.50 to 15.00
Domestic Coating Bulk (mine) ton	12.00 to 22.00
Imported (ship side) Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	2.00 to 2.25
Gelatine (silicin), lb.	.90 to .95
Glyc. (C.P.) drums, lb.	18.25 to 18.75
Litharge, powd., bbl., lb.	.09 to -
Rosin (Gum)—	
New York, per 100 lbs.	
E	3.06-
F	3.18-
G	3.37-
WW	3.75-
Rosin (Wood), carlots	3.13-
Salt Cake—	
Dom. bulk (wks) ton	15.00 to 16.00
Imp. bulks on dock—(Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—	
Solid, drums, cwt.	2.30 -
Ground and flake, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.00
40 deg., 55 gal. drums, (works) cwt.	.90 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.30-
barrels, cwt.	3.30-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 21.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¾ to .06
Calcium Pig., bbls., lb.	.06 to .06¼
Zinc Sulphide, bbls., lb.	.08¼ to .88½

WOOD PULP

OPA maximum prices applicable to wood pulp delivered to consumer mills located East of the Continental Divide exclusive of Denver, Colo.:

Bleached softwood sulphite	$76.00
Unbleached softwood sulphite	66.00
Bleached hardwood sulphite	73.50
Unbleached hardwood sulphite	63.50
Bleached Mitscherlich sulphite	81.00
Unbleached Mitscherlich sulphite	72.00
Northern bleached sulphate	86.00
Southern bleached sulphate	79.00
Northern semi-bleached sulphate	82.00
Southern semi-bleached sulphate	75.00
Standard news print siderurus	46.00
Northern unbleached sulphate	73.00
Southern unbleached sulphate	63.50
Bleached soda pulp	66.00
Unbleached soda pulp	62.00
Ground wood pulp	46.00
Sulphite screenings	38.50
Sulphate screenings	38.00
Ground wood screenings	30.00
Northern unbleached sulphate siderurus	73.00
Southern unbleached sulphate siderurus	63.50

PAPER
f. o. b. New York City

Boards—	per ton
Binders	84.00-
Chip	45.00-
Chip, sgl. mls. lined	60.00-
Coated, white patent .016	80.00-
.020 and heavier	75.00-
Kraft liner	80.00-
News	48.00-

Book (easel)	per cwt.
No. 1 Coated	15.50-
No. 2 Coated	14.00-
No. 3 Coated	13.25-
No. 4 Coated	12.75-
No. 2 Offset	11.75-
A Grade Super	10.75-
B Grade Super	10.25-

Bonds (Rag Content)—	per cwt.
100% Rag Ext. No. 1	42.00 to 46.00
100% Rag	33.00 to 37.75
85% Rag	
75% Rag	26.00 to 29.00
65% Rag	
50% Rag	20.30 to 22.75
25% Rag	18.30 to 20.00
Regular Colors	1.00 cwt. extra

Bonds (Sulphite)—	per cwt.
No. 1	11.70-
No. 2	10.75-
No. 4	9.90-
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	per cwt.
Embossed (25 lb. up)	13.75 to 14.25
Bleached (25 lb. up)	12.75 to 13.25
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	11.00 to 11.50
Unbleach. (25 lb. up)	10.00 to 10.50

Ledgers (Rag Content)—	per cwt.
100% Rag Ext. No. 1	41.40 to 48.50
100% Rag	36.25 to 39.25
85% Rag	32.30 to 37.75
75% Rag	28.15 to 30.50
65% Rag	22.80 to 27.75
50% Rag	22.10 to 24.25
25% Rag	19.50 to 21.50
Regular Colors	1.00 cwt. extra

Ledgers (Sulphite)—	per cwt.
No. 1	13.00-
No. 3	12.05-
No. 4	11.30-

News—	per ton
Rolls (Contract)	50.00-
Rolls (Spot)	(nominal)
Sheets	58.00-

Tissues (Carlots)—	per ream
White, No. 1	1.12½
White, No. 2	1.00-
Bleached Anti-Tarnish	1.15-
Colored	—
Anti-Tarnish Kraft	.70-
Manila	.90 to .95
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.60-
Napkins, full crepe and emb'sed (12½ lb. to M shts.) per cs.	.60-
Toilet, Bleached (M shts.) per cs.	5.65-
Toilet, Unbleached (M shts.) per cs.	4.25-

Towels—	per case
Bleached	3.20 to 3.75
Unbleached	2.60 to 3.05

Wrappings (Kraft)—	per cwt.
Extra Quality	6.00 to 7.00
Super-Standard	5.25 to 6.00
Northern Standard	4.75 to 5.00
Southern Standard	4.75 to -
Standard Bag	4.37½-

Wrappings (Sulphite and Bleached Kraft)—
(Rolls, f. o. b. mill)

Bleached papers—	per cwt.
M.F. & M.G. Waxing, 20 lb. (Carloads only)	7.25 to 7.50
(10,000 lbs.)	7.50 to 7.75
Drug wrapp. 35 lb.	7.00 to 7.25
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	5.25 to 5.50
No. 1 Butchers	5.50 to 5.75
No. 1 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.25 to 6.50
No. 2 Imit. Parch & Dry Fin. Groc. Sulphite 30 lb.	6.00 to 6.25
Steam Finish, 50 lb.	5.00 to 5.25
Water Finish, 40 lb.	5.25 to 5.50
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	6.00 to 6.25
Envp. Mla., Sub. 16-28 (No. 2)	5.75 to 6.00
Envp. Mla. (Prices based on large sheets untrim'd remarked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	6.00 to 6.25
No. 2	5.75 to 6.00
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-32 lb.	7.20 to 7.40
Grade B-30 lb.	7.25 to 7.50

BEATER CAPACITY INCREASED 133%

- Same number of beaters
- No loss of freeness
- Actual increase in tear strength and Mullen

THE BAUER DOUBLE-DISC PULPER MAKES IT POSSIBLE

If you operate beaters, you will be interested in what recently happened in an Ohio mill. Without using extra beaters this mill had to *double* their use of a particular grade of pulp. Increased jordaning was out because they had to preserve freeness and tearing strength.

They installed a 24" Bauer double-disc pulper powered with but two 50 H.P. motors. The result . . . increase in beater capacity from 6 tons per day to 14 and at the same time, an actual increase in tear strength.

These results are typical Bauer pulper results. For full operating details and performance characteristics of Bauer pulpers, write

THE BAUER BROS. CO.
SPRINGFIELD, OHIO

THE BAUER BROS. CO. SPRINGFIELD, OHIO

CHEMIPULP PROCESS INC.

CHEMICAL PULPING PROCESSES

Hot Acid Cooking and Recovery Systems
Chemipulp--K-C Digester Circulating Systems with Chip Distributor and Full Automatic Controls

●

Chemipulp--K-C Improved Acid Plants
Gas Fortifying High Acid Concentration

●

Digester Waste Liquor SO_2 Gas & Heat Recovery
Chip Pretreatment Preparatory to Cooking

●

800 Woolworth Building, WATERTOWN, N. Y.
3311 First Avenue South, SEATTLE, WASH.

- Associated with -

CHEMIPULP PROCESS LIMITED
403 Crescent Building, Montreal, P. Q.

Research STARTS THINGS TO HAPPENING

Necessity is a very strong urge. It gets things done fast and well. To do them, Industry must be supported by all the known facts and be encouraged with the promise of new ones. That way Progress lies. At Lindsay, Research is charged *continuously* with providing more and more data from which come better Fourdrinier wires and ultimately better paper.

THE LINDSAY WIRE WEAVING CO.
Serving the Paper Industry Since 1903
14001-14299 Aspinwall Ave., Cleveland

Lindsay **WIRES**

"NON-USERS ARE THE LOSERS"

TENAX FELTS

PROFIT PRODUCERS

Convention Gossip

Superintendents of paper and board mills tell one another about the long-lasting-service they keep getting from TENAX FELTS. The satisfaction they have had for years from these dependable producers, nowadays makes ardent TENAX boosters of them as their production problems increase.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY
NEWFANE, N. Y.—U.S.A.

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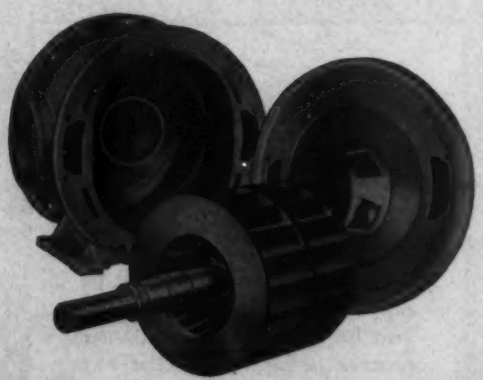

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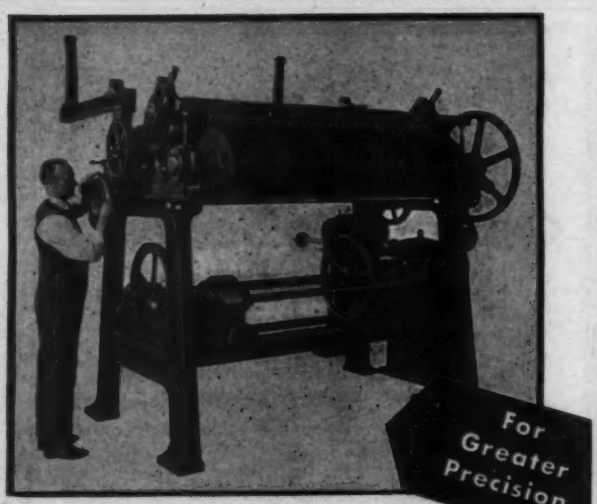

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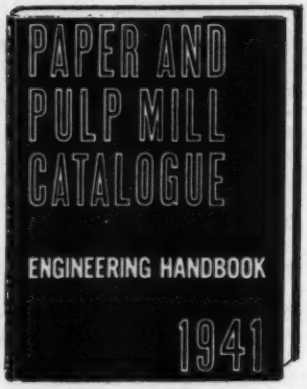

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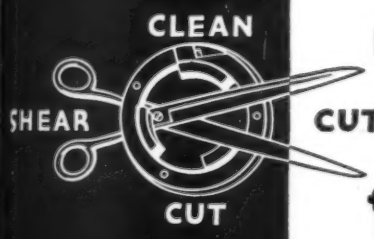
are accurately machined and balanced for high speed operation. They make solid, straight-edged, clean cut rolls from any grade of paper or paperboard. For exceptional performance with low maintenance, you can depend on Langston Slitters and Roll Winders.



DOWNINGTOWN

Downingtown Rubber Covered Suction Press Roll as used on Fourdrinier and Cylinder Machines.

MAINTENANCE HINTS

for "Azon" Rubber Covered Suction Press

(1) Do not over-weight the roll at any time. Follow the pressures recommended by the machinery builders.

(2) When removing the weights at the time of a paper break, "all weights" should be "removed" from "both ends" at the "same time". Even a momentary running with pressure removed from one end only, might do serious damage to the opposite end, where the pressure would become excessive.

(3) Do not over-lubricate. Excess oil may overflow to the inside of the shell and run through the holes onto the rubber, causing a weakening of the rubber itself and damage to the bond.

(4) It is common practice to rope and wash felts on "plain" rubber covered press rolls, but many mills consider the risk too great with rubber covered "suction" press rolls. Some mills rope and wash their suction press felts by the following method, thereby reducing the hazard of damage:

(A) All weights and rods are removed from the top roll arms so that a free top roll rests on the felt.

(B) The felt is first washed with warm water only; then washed with a wool soap.

(C) The paper machine is operated at about 25% of its normal speed during the washing operation.

(D) The felt is not allowed to "bunch" in the usual manner as on plain presses, but is kept as flat and thin as possible.

P. S. Downingtown Suction Felt Rolls and other felt conditioners often make it unnecessary to wash a felt during its life . . . and, if you don't have such equipment, possibly it would be better to wear out a few extra felts rather than risk injuring an expensive rubber covered suction press.

DOWNINGTOWN MANUFACTURING COMPANY, DOWNINGTOWN, PA.